JVC

SERVICE MANUAL

COLOUR VIDEO CAMERA

MODEL TK-885E

BASIC CHASSIS
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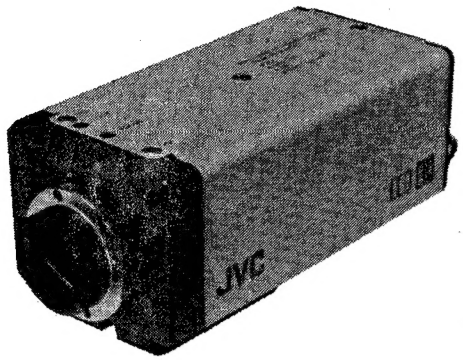

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(NOTE) Electrical components having special safety-related characteristics are identified by shading (▭) on the schematic and by (⚠) on the parts list in Service Manual. When replacing these components, be sure to use designated parts.

SPECIFICATIONS

Item	Content	Item	Content
Type	Colour video camera head	Selective functions	AGC (automatic gain control) selection "ON/OFF", Shutter mode selection "NORM/1/1000", White balance selection ☀ (natural light), Ⓐ (TTL auto-pursuit), ☀ (illumination light)
Signal system	Conforms to PAL system		
Image pickup device	1/2-inch solid-state CCD, single-board type.		
Number of effective picture elements	500 (horizontal) × 582 (vertical)	Lens mount	CS mount (C mount when adapter is used)
Number of scanning lines	625 lines, 2:1 interlaced	Power supply	DC 12 V (± 10%), ripple voltage of less than 50 mV
Sync system	Internal sync		
Video output	Composite video signal/1.0 Vp-p, 75 Ω unbalanced, terminal BNC connector	Power consumption	3.5VA (DC 12V)
		Operating temperature range	−10°C ~ +50°C
Video S/N ratio	47dB	Operating humidity range	Less than 90% Rh (without condensation)
Resolution	320 TV lines (horizontal)	Provided accessories	Lens mount cap × 1 C-mount adaptor × 1 Iris plug (3 pin) × 1
Minimum object illumination	10Lux (F1.4, AGC "ON")		
Standard object illumination	2000Lux	Fuse	QMF51E2-1R0S (1A)
		Dimensions	Width 64 mm (max.), depth 150 mm (max.), height 62 mm (max.) (including C-mount adaptor and cable clip)
		Weight	Approx. 500 g. (including C-mount adaptor)

** Design and specifications are subject to change without notice.*

No. 50106
Aug. 1988

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2. ADJUSTMENT

3. PARTS LIST

4. STANDARD CIRCUIT DIAGRAM

JVC | Instruction Book
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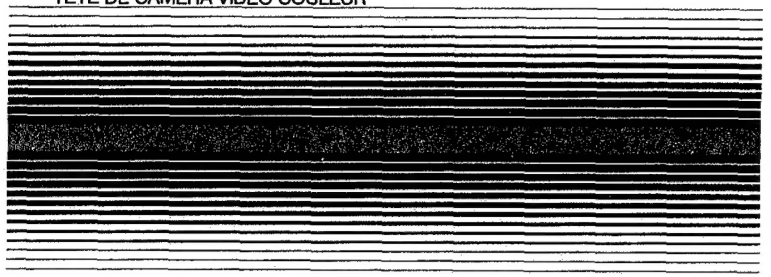
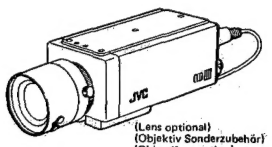
COLOUR VIDEO CAMERA HEAD
FARB-VIDEOKAMERAKOPF
TETE DE CAMERA VIDEO COULEUR

TK-885E





(Lens optional)
(Objektiv Sonderzubehör)
(Objectif en option)

FEATURES

CCD (Charge Coupled Device) solid-state pickup
CCD pickup elements are extremely durable and resistant to shocks and vibrations. There is virtually no image lag, burn or geometrical distortion.

High resolution, high sensitivity
The CCD complementary colour system makes possible a high resolution of 320 TV lines, with a superior low-light sensitivity of 10 lux.

TTL (through-the-lens) auto white balance adjustment
The white balance is optimized by auto tracking of the colour temperature of the ambient light. The sensor detectes the colour temperature of the light entering through the camera lens.

1/1000-Second high-speed electronic shutter
The high-speed shutter mode allows fast-moving objects to be recorded with excellent detail. In still or slow-motion playback, profiles of these objects are clear with no blurring.

Exchangeable lens mount (C/CS)
C (for 1/2", 2/3" or 1" video camera lenses) and CS (1/2" video camera lenses) lens mounts can be installed so that selection from a wide range of lenses is possible.

Easy installation
The camera has installation holes on both its top and bottom panels, while its extremely compact size and light weight make possible installation almost anywhere. External fine adjustment of the flange-back is possible. Power supplies of DC 12 V can be used. With the optional AC adaptor AC-C624 (for the U.K.) or AC-C622 (for countries other than the U.K.), AC 220 – 240 V can also be used.

PRECAUTIONS

Installation
- **Never expose the camera to rain or water.** Water can cause malfunctions and damage the camera.
- **Do not install the camera where the temperature could exceed the allowable range.** If used at extemely low or high temperatures, the camera could be damaged (allowable operating temperature range: -10°C to +50°C).
- **Avoid installing in humid or dusty places.** This could damage the camera.
- **Avoid installing in places where there are radiations.** This could damage CCD and other components and cause a malfunction.
- **Avoid installing in places where there are strong magnetic fields and electric signals.** The monitoring picture may be distorted.
- **Avoid installing in places where it will be subject to strong vibrations.** This could damage components and degrade the picture.

WARNING:
TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

CAUTION:
To prevent electric shock, do not open the unit. No user serviceable parts inside. Refer servicing to qualified service personnel.

CAUTION:
To prevent electric shocks and risk of fire hazards, do NOT use other than specified power source.

This installation should be made by a qualified service person and should conform to all local codes.

*This instruction book is divided into three sections, English, German and French:

Thank you for purchasing a JVC colour video camera head. The TK-885E is high-quality camera that uses a single CCD (Charge Coupled Device) pickup element.
To obtain the best results from your new camera, read this instruction manual carefully before use.

CONTENTS

Use
- **Do not point the camera towards the sun.** This could damage the camera regardless of whether it is operating or not.
- **Do not shoot sources of bright light.** If the object contains very bright areas, vertical or horizontal bright lines may appear on the screen. This is called "smear", a phenomenon which often occurs with solid-state pickups, and is not a malfunction.
- **Do not disassemble the camera.** Never touch the inside of the camera. This could damage the camera.
- **Do not allow anythings to get inside the camera.** If a metal or flammable object gets inside the camera, it may cause a malfunction.
- **Handle with care.** Do not drop the camera or subject it to shocks and vibrations to avoid possible damage.

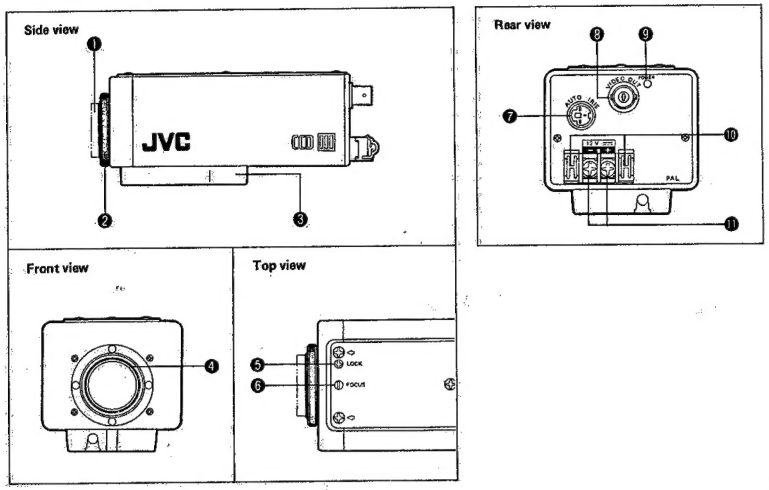
When improper operation or a malfunction is observed:
While operating, if any abnormal condition (strange sound, smell or smoke) or malfunction (no picture, etc.) is observed, stop using the camera immediately, turn the power off, then call your local dealer.

Cleaning
Turn the power off and wipe the dirt away with a dry soft cloth. If it is extremely dirty, use furniture cleaner to wipe it off.
To clean lenses, use a blower or lens cleaning tissue (available from any camera dealer).

1. INTRODUCTION AND REPAIR SERVICE

OPERATING INSTRUCTIONS

CONTROLS AND CONNECTORS



❶ Lens mount cap
Be sure to cap the lens mount when the lens is not mounted. (The lens mount cap is in place when shipping.)
To attach: Turn clockwise.
To remove: Turn counterclockwise.

❷ C-mount adaptor
Attach to change the lens mount from "CS" to "C".
(The C-mount adaptor is attached when shipping.)
To attach: Turn clockwise.
To remove: Turn counterclockwise.

If the adaptor is attached so tightly that is difficult to remove, use long-nosed pliers to remove it. Insert the tips of the pliers into the holes with no groove, then turn to remove.
A screwdriver can also be used, as shown. Insert M3 screws into the holes so that the screwdriver has something to grip. (Use the same method when the adaptor and lens are attached too tightly.)

❸ Tripod mounting base
2 screw holes (1/4"-20UNC) are provided for mounting the camera on a fixed or rotating base or tripod. This base can also be installed on the top panel for greater flexibility in installation.
The iris cable of the lens can be stored and fixed in this base. (See pages 9, 10 and 19.)

❹ Lens mount
The camera has a CS mount; C-mount lenses can be used when C-mount adaptor ❷ is attached.
(The C mount adaptor is attached when shipping.)
C mount: For 1/2", 2/3" or 1" video camera C-mount lenses.
CS mount: For 1/2" video camera CS-mount lenses.

❺ LOCK screw
Loosen this screw when adjusting the flange-back (distance between the focal point and the lens mount). Upon completion of adjustment, retighten it.

❻ FOCUS screw
Turn to adjust the flange-back when focusing is not possible with the focus ring of the lens. (See page 14.)

❼ AUTO IRIS connector
Connect the iris cable of an auto-iris lens. If the lens' cable plug is a different type, use the provided 3-pin iris plug. (See page 11.)

❽ VIDEO OUT connector
BNC connector that outputs a composite video signal. Connect to the video input connector of a monitor, switcher, etc.

❾ POWER indicator
Lights when the camera is powered.

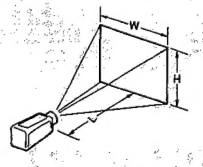
❿ Cable clip
Use to hold the iris cable of an auto-iris lens. (See pages 9 and 10.)

⓫ 12 V ⎓ power input terminals
Connect to a DC 12 V power source. An AC 220 – 240 V source can be used with the optional AC adaptor AC-C624 (for the U.K.) or AC-C622 (for countries other than the U.K.). (See pages 12 and 13.)

USING LENSES

- The TK-885E can use 1/2", 2/3" or 1" video camera C-mount lenses when the C-mount adaptor (standard accessory) is installed. When removed, 1/2" video camera CS-mount lenses can also be used.
- Use a suitable lens for the required area of view. The area of view for different focal lengths can be obtained using the following formulae. (Use as reference data, when the distance between camera and object (L) is more than 100 times the focal length (f).)

Formulae for obtaining the area of view	$H = \frac{4.6 \times L}{f}$	$W = \frac{6.2 \times L}{f}$



H: Height of the area of view (m)
W: Width of the area of view (m)
L: Distance between camera and object (area of view (m))
f: Focal length of the lens (mm)

- The optional JVC colour video camera lenses HZ-C7.5U and HZ-C6U can be used.

Model No.	Focal distance	Max. aperture ratio	Iris	Focus
HZ-C7.5U	f = 7.5 mm	f/1.4	Automatic	Fixed
HZ-C6U	f = 6 mm	f/1.2	Automatic	Fixed

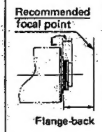
*The HZ-C7.5U is for colour video cameras with a pickup element of 2/3" or less, the HZ-C6U is for those with a pickup element of 1/2" or less.
*The HZ-C7.5U and HZ-C6U are equipped with the 3-pin iris plug that matches the TK-885E's AUTO IRIS connector.

Example of calculation of area of view
The area of view, when the distance between camera and object (area of view) is 15 m with the optional HZ-C7.5U lens attached, can be calculated as follows.

Heights of area of view (m)	Width of area of view (m)
$H = \frac{4.6 \times L}{f}$	$W = \frac{6.2 \times L}{f}$
$= \frac{4.6 \times 15}{7.5}$	$= \frac{6.2 \times 15}{7.5}$
$= 9.2$	$= 12.4$

As above, the area of view will be of approx. 9.2 m high and approx. 12.4 m wide.

Notes:
- Use auto-iris lenses powered by DC 9 V – 10 V with power consumption of 50 mA or less.
- L in the illustration below should be as shown in the following table. If L exceeds the value in the table, it may damage the inside of the camera and correct mounting may be impossible; never use such lenses. Be careful not to attach the C-mount adaptor when using a CS-mount lens.



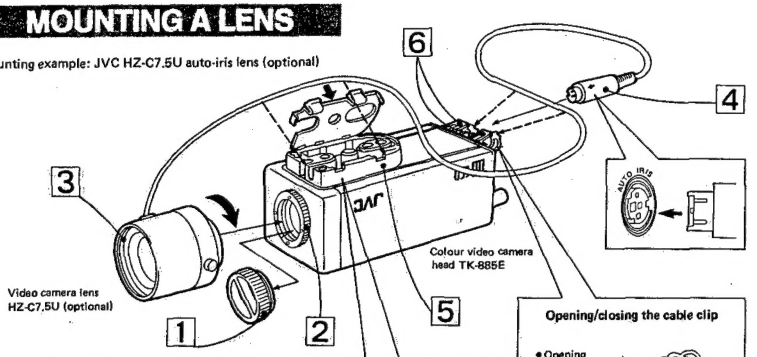
Lens	Flange-back	Distance L
C-mount lens*	17.526 mm	Less than 9 mm
CS-mount lens**	12.5 mm	Less than 4 mm

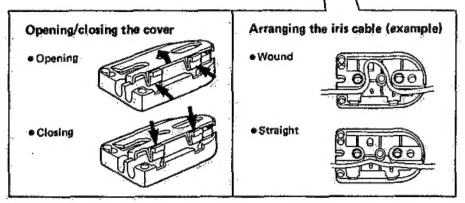
* With the C-mount adaptor attached.
** With the C-mount adaptor removed.

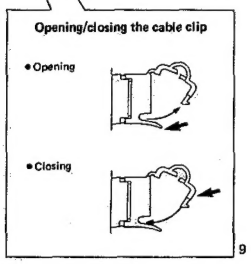
- Lenses designed for colour video cameras are recommended. Lenses designed for B/W cameras may have inferior colour reproduction and picture quality. In particular, they are not suitable for use outdoors or in very bright conditions. When using a lens with an ND filter attached, camera shooting may not be possible with the specified minimum required illumination.

MOUNTING A LENS

Mounting example: JVC HZ-C7.5U auto-iris lens (optional)







1 Turn the lens mount cap to remove it.

2 Attach or remove the C-mount adaptor depending on the lens used.

C-mount adaptor	Lens mount	Acceptable lenses
Attached	C mount	1/2", 2/3" or 1" video camera/C-mount lens
Removed	CS mount	1/2" video camera CS-mount lens

* The C-mount adaptor is atatched when shipped.
* The optional JVC HZ-C7.5U is a C-mount lens for 2/3" colour video cameras.

3 Attach the lens to the lens mount. Secure it so it does not get loose.
* The JVC HZ-C7.5U video camera lens (optional) is designed so it can be rotated even after it is attached to the camera. If the lens cable is not positioned correctly, forcibly turn the lens to adjust the position.

4 If the lens has an auto-iris, connect the auto-iris plug (3-pin) to the AUTO IRIS connector. (See page 11.)
* Use an auto-iris lens that processes the video signal as the input signal.

5 If the lens has an auto-iris, attach the auto-iris cable to the camera with the tripod mounting base (when the cable is too long).

6 If the lens has an auto-iris, secure the auto-iris cable with the cable clip (when the cable is too long).

Notes:
- Read the instruction manual of the lens carefully.
- Auto-iris lenses are recommended to obtain maximum benefit from the camera.
- If the auto-iris lens has a different type of plug, replace with the plug provided. (See page 11.)
- A cable with a diameter of 2 mm – 4.5 mm can be secured with the tripod mounting base and the cable clip.
- When mounting a lens, it may require adjustment of the flange-back and the lens that processes the video signal as the input signal. (See page 14.)

CONNECTIONS

- Do not turn the power of any equipment connected on until all connections are completed.
- Read the instruction manuals of all equipment to be connected.

1 AUTO IRIS connector

- Connect the auto-iris plug of the auto-iris lens.
- If the auto-iris lens has a different type of auto-iris plug, replace with the plug provided.

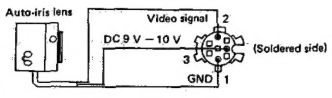
Note: Use auto-iris lenses using DC 9 V – 10 V with a power consumption of 50 mA or less.

Pin assignment: AUTO IRIS connector (3-pin)

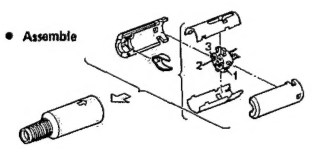
Pin No.	Signal
1	GND
2	Video (high impedance)
3	DC 9 V – 10 V (50 mA max.)

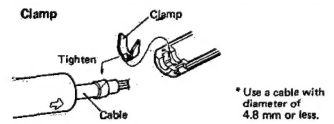
Provided iris plug (3-pin) QMC0308-001

- **Connections** Use this plug by soldering it to the lens control cable.



- **Assemble**



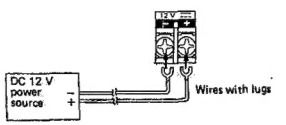


2 VIDEO OUT connector

- BNC connector for video signal output.
- Connect to the video input connector of equipment such as a monitor, switcher, etc.
- Use a coaxial cable for connection.

3 Power input terminals (12 V ⎓)

- For power supply from a DC 12 V source.
- When connecting; be sure that the polarities (+/–) are correct. The use of wires terminated by lugs is recommended.
- The power voltage is specified as DC 12 V (±10 %).
- The optional AC adaptor AC-C624 (for the U.K.) or AC-C622 (for countries other than the U.K.) which is designed exclusively for use with the TK-885E is also possible. (See next page.)



Notes:
- Be sure not to connect the power source until all other connections are complete. Do not turn the power of any equipment on until connections are completed.
- Use a DC 12 V power source with a ripple voltage of less than 50 mV.
- When powered, the POWER indicator on the rear panel will light.

AC Adaptor AC-C624 and AC-C622 (optional)

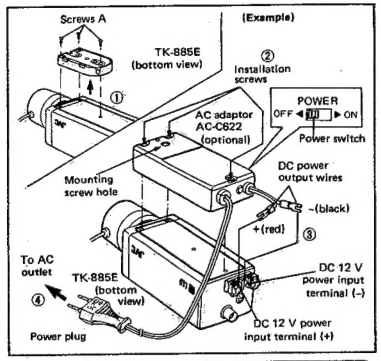
- An AC adaptor designed exclusively for use with the TK-885E, to receive line AC power; installed on the bottom of the camera.
- A power voltage of AC 220 ~ 240 V can be used.
- This AC Adaptor is available in two models:
  AC-C624 (for the U.K.) and AC-C622 (for countries other than the U.K.). Both are identical in construction and specifications except that the U.K.-bound AC-C624 is shipped without plug at the end of the provided power cord.

Installation

① Loosen three screws A to remove the tripod mounting base.
② Install the AC adaptor to the camera with the 3 screws provided with the AC adaptor. (The screws provided with the AC adapter cannot be removed.)
③ Connect the DC power output wires to the camera's DC 12 V terminals, making sure that the polarity is correct.
- Polarity of DC power output wires
  Black: "–" (negative)
  Red: "+" (positive)

④ Connect the power plug to the AC outlet.
When using the AC-C624, connect the power cord to the power plug beforehand.

*When the power switch is set to on, power is supplied to the camera.

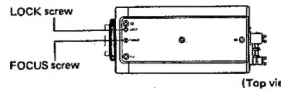


Notes:
- Be sure connect the power plug of the AC adaptor after completing all other connections. When connecting, be sure to turn the power off.
- A mounting screw hole is provided in the bottom panel of the AC adaptor so that the camera can be installed on a tripod, etc. with the AC adaptor attached.
- The AC adaptor cannot be installed on the top panel of the camera.
- Read the instruction manual of the AC adaptor.

ADJUSTMENTS (LENS)

Flange-back adjustment

When a lens is mounted, the adjustment of flange-back (the distance from the lens mounting place to the focal point) may sometimes be required. Adjust when focusing with the lens' focus ring is not possible.



With a fixed-focus lens

① Loosen the LOCK screw.
② Fully open the aperture and set the focus ring to "∞" (infinity).
③ Turn the FOCUS screw to focus.
④ When you obtain the possible best focus, tighten the LOCK screw to fix in that position.

Note:
- When focusing, point the camera at an object that is more than 2000 times the focal length of the lens away from the front of the lens. (For example, if the focal length is 7.5 mm, the object should be more than 15 m away from the camera.)

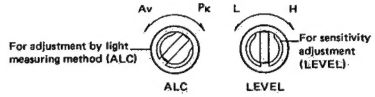
With a zoom lens

① Loosen the LOCK screw.
② Fully open the aperture and set the lens to the maximum telephoto position. Then turn the focus ring to focus.
③ Set the lens to its maximum wide-angle position, and turn the FUCUS screw to focus.
④ Repeat steps ② and ③ until the difference betwen focusing positions ② and ③ is smallest.
⑤ When the best focusing point is found, tighten the LOCK screw to fix it.

Note:
- When focusing, point the camera at an object that is more than 5 times the minimum focal distance away from the lens. (For example, if the minimum focal distance is 1 m, the object should be more than 5 m away from the camera.)

With an auto-iris lens (Example: JVC HZ-C7.5U (optional))

With an auto-iris lens that processes the images as an input signal, adjustment may be required.



Adjustment by light measuring method (ALC)

Choose the best light measuring method depending on the situation, and adjust to obtain the best possible picture while monitoring it.

Av (counterclockwise): For the average light measuring method. This measures the object's brightness to calculate the average level of the video signal to obtain the optimum iris setting automatically.

PK (clockwise): For the peak light measuring method. It measures the object's brightness to calculate the highest brightness (peak) level of the video signal to obatin optimum iris setting automatically.

Notes:
- When halation occurs in part of a picture (the brightest part), turn to PK side to prevent it.
- When the picture becomes too dark except for bright parts, turn to Av side to prevent it.
- If the picture tone does not change much even when the ALC control is turned, it indicates that the average measuring method is appropriate. In this case, adjust the LEVEL control for sensitivity adjustment.
- Read the instruction manaul of the lens together with the notes.

Sensitivity adjustment (LEVEL)

With an object which has comparatively low contrast under sufficient light (more than 1000 lux), adjust until the optimum brightness and gradations are obtained on the screen of the monitor.
With an object (which has comparatively low contrast) the appearance of which does not change with ALC adjustment, the contrast of the picture may appear to vary. In this case adjust the LEVEL control to obtain the optimum picture.

L (counterclockwise): Reduces the video signal level to make picture darker. (If the picture has too much contrast, turn to "H" side.)

H (clockwise): Increases the video signal level to make picture brighter. (If the picture has too little contrast, turn to "L" side.

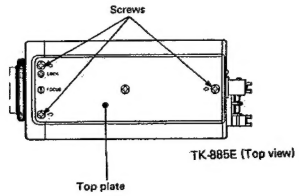
Notes:
- The LEVEL control is for adjustment of the level of the video signal, therefore do not turn it too often as this may degrade picture quality, lower sensitivity, or sometimes cause the lens to malfunction.
- Read the instruction manual of the lens in addition to these notes.

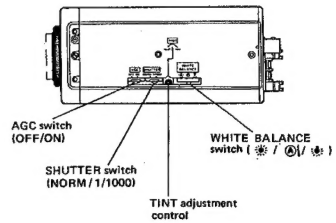
ADJUSTMENTS

Adjust the camera settings depending on the conditions in which it is used. Adjustment controls located on the top of the camera include:

Adjustment/setting functions
• AGC (Automatic Gain Control) switch • SHUTTER mode switch • TINT adjustment control • WHITE BALANCE mode switch

- When performing adjustments, loosen the three fixing screws to remove the top plate. Upon completion of adjustments, be sure to reinstall the plate.





AGC (Automatic Gain Control) switch

This automatically increases camera's sensitivity when the level of ambient light drops.

ON: AGC activated.
OFF: AGC not activated.

Notes:
- When AGC is activated, the picture will become grainy.
- The AGC switch is set to ON when shipped.

Shutter mode switch

When shooting fast-moving objects, playback pictures will be blurred. The TK-885E incorporate a high-speed electronic shutter that allows switching the speed (the time the charge is stored) between 1/50 (normal) and 1/1000 second. At the higher speed, each frame is recorded with greater detail.

NORM: Normal 1/50 second (normal-speed shutter mode).
1/1000: 1/1000 second (high-speed shutter mode).

Notes:
- The 1/1000-second setting requires more light than the normal-speed mode. It is recommended to use this mode in brightly lit conditions, such as outdoors with sunlight. (The sensitivity in the 1/1000 mode drops to approx. 1/20 that in the NORM mode.)
- In the 1/1000-second mode, shooting with artificial lighting (especially fluorescent lights) will cause the pictures to flicker. Smear (horizontal or vertical bright lines) which can often be seen with solid-state pickups may appear in the picture.
- This switch is set to NORM (normal 1/50 second) when shipped.

White balance mode switch

This sets the camera's response so that pictures have correct colours with illumination with different colour temperatures. (For adjustment, use a colour video monitor which has been adjusted correctly.)

☀ : For shooting under the natural (sun) light (colour temperature approx. 5500 K).
Ⓐ : Accepts different types of lighting (colour temperatures ranging from approx. 3000 K to 6000 K) using an automatic tracking system. (The TK-885E use a TTL system that measures light entering through the camera lens.)
💡 : For shooting under the artificial light such as halogen lamps (colour temperature approx. 3200 K).

Notes:
- The automatic tracking system may not function properly when shooting with a special light source or the source with a colour temperature that exceeds the range of the camera. Because it uses a TTL system, if shooting a coloured object (especially one with a single colour) that fills most of the camera's area of view, the colour temperature may be judged incorrectly and the correct white balance adjustment may not be possible. In such a case, set to the ☀ or 💡 position.
- When the camera is to be used by installing on a rotating base for panning or tilting, it is recommended to set to the ☀ or 💡 position. If set to Ⓐ, it may cause unstable pictures since the white balance setting will change continuously.
- It is set to Ⓐ position when shipped.
- When using set to the ☀ or 💡 position, fine adjustment of the tint is possible to suit the conditions. (See next section.)

Tint adjustment control

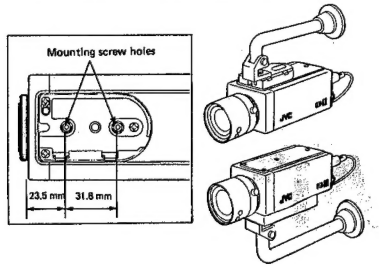
This allows fine-adjustment of tint. Adjust so that white objects displayed on video monitor are reproduced as white.

BLUE (counterclockwise): To give the picture a bluish tint.
RED (clockwise): To give the picture a reddish tint.

Notes:
- Before adjusting, check to see that the white balance switch is set to the ☀ or 💡 position. When set to the Ⓐ position, tint adjustment is not possible.
- Be sure the tint of video monitor used is adjusted correctely.

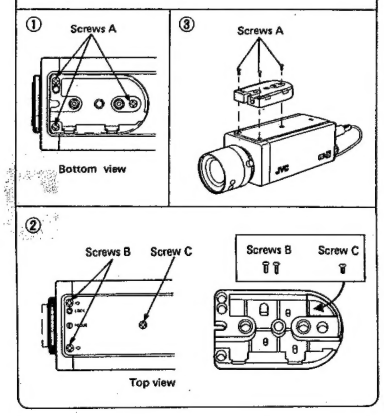
INSTALLATION

The camera can be installed to a tripod, mounting bracket, etc., by securing either the top or bottom panel using the mounting screw holes (1/4"-20UNC) in the tripod mounting base.
2 mounting screw holes are provided. In order to improve the strength of installation in special situations, use both holes.



The tripod mounting base is attached to the bottom panel when the camera is shipped. When the top panel is used for installation, reposition the base on the top panel.

Repositioning procedure
① Remove the three screws A to remove the tripod mounting base.
② Remove the two screws B and screw C. (Those screws are not used. Store them by screwing into the tripod mounting base.)
③ Attach the mounting base on the top panel with three screws A.



SPECIFICATIONS

Type	: Colour video camera head
Signal system	: Based on PAL standard
Pickup element	: Interline-transfer system CCD solid-state image sensor (Complementary color filter provided)
Pickup colour system	: Single CCD complementary colour system
No. of effective pixels	: 500 (H) x 582 (V)
Pickup area	: 4.6 (V) x 6.2 (H) mm (equivalent to 1/2" format)
Scanning lines	: 625 lines, 2:1 interlaced
Scanning frequency	: (H) 15.625 kHz (V) 50 Hz
Sync system	: Internal
Video output	: Composite video signal/1 Vp-p, 75 ohms, unbalanced BNC connector
Video S/N	: 47 dB (luminance signal, AGC switch set to "OFF", shutter mode set to "NORM")
Horizontal resolution	: 320 TV lines
Minimum required illumination	: 10 lux (f/1.4, AGC switch set to "ON", shutter mode set to "NORM")
Recommended subject illumination	: 2000 lux (shutter mode set to "NORM")
Switching function	: AGC (ON/OFF), shutter mode (NORM / 1/1000), white balance mode (☀/Ⓐ/💡)
Adjusting function	: Flange-back, tint
Lens mount	: C mount (with C-mount adaptor)/ CS mount (without C-mount adaptor)
Power requirement	: DC 12 V (±10 %), ripple voltage 50 mV or less
Power consumption	: 3.5 VA (DC 12 V)
Operating temperature range	: -10°C – +50°C
Operating humidity	: Less than 90 % Rh (noncondensing)
Dimensions	: Width: Approx. 64 mm Height: Approx. 62 mm (including tripod mounting base) Depth: Approx. 150 mm (including C-mount adaptor and cable clip)
Weight	: Approx. 500 g (including C-mount adaptor)

■ **Provided accessory**
Iris plug (3-pin) x 1
Lens mount cap x 1
C-mount adaptor x 1

(The lens mount cap and C-mount adaptor are attached in place when shipping.)

*This colour video camera head is designed to output video signals conforming to the PAL standard, so that it cannot be used with video recorders or colour monitors which use colour systems other than PAL.

*Design and specifications subject to change without notice.

Printed in Japan
TK-885E-1 BJA
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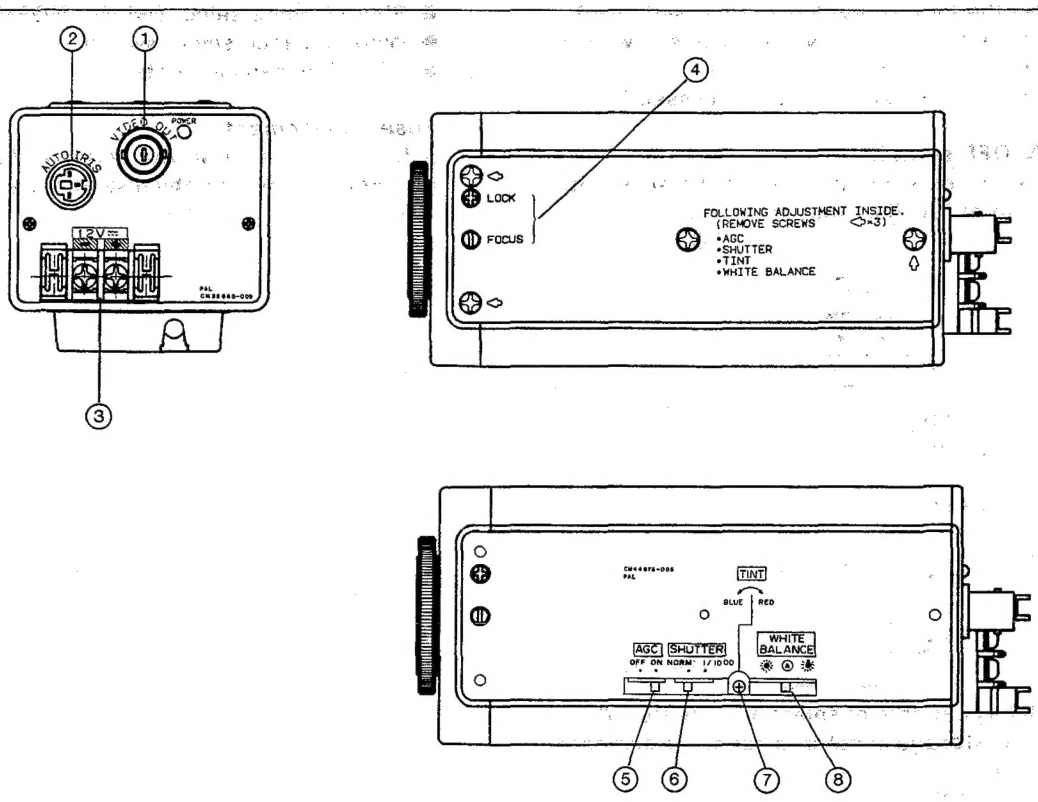
SPECIFIC SERVICE INSTRUCTIONS & PRECAUTIONS



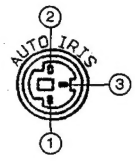
When the top plate is removed

■ EXTERNAL TERMINALS AND ADJUSTMENTS ON SETUP

① VIDEO OUT terminal

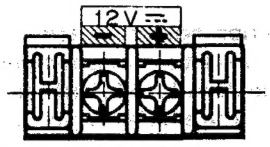
To this terminal, connected is the VIDEO IN terminal of a video monitor, a VTR, etc.

② LENS terminal



Pin No.	Signal
①	GND
②	VIDEO
③	DC9V-10V (50mA max)

③ Power terminal



- **DC 12 V input terminals**

Note: When 12V DC is used as a power supply, make sure the positive and negative terminals are connected correctly. A reverse in polarity may cause malfunction.

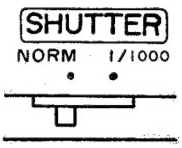
④ **Back focus adjustment screw**
Of this camera, the back focus can be adjusted from outside.
1) Loosen the lock screw (cross recessed head).
2) Adjust the back focus by the focus screw. (For details, "Adjustment Procdures".)
3) Lock by the lock screw (cross recessed head).

⑤ **AGC ON/OFF switch**
This switch selects whether or not the sensitivity is corrected at low illumination.

TOP VIEW

ON : AGC operation
OFF: no AGC operation

⑥ **Shutter mode select switch**

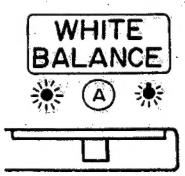


TOP VIEW

This switch is capable of selecting a shutter speed (signal load storage time) in a range of standard 1/50 sec. to 1/1000 sec.
1/1000: 1/1000 sec. mode
NORM : Normal mode (1/50 sec.)

⑦ **Tint VR**
This VR fine-adjusts the tint.
Use to externally adjust the tint (hue) caused by differences between different lenses and optical sources.

⑧ **White balance select switch**
This switch sets the color temperature according to the installation location of the camera head, as color temperature differs with installation location.



TOP VIEW

Switch position		Color temperature
INDOOR	☀	About 3200°K
OUTDOOR	☀	About 5500°K
AUTO WHITE	AW	About 3000°K ~ 6000°K

⑨ **Factory switch settings**
Switches are factory set as follows:
- AGC ON/OFF switch : ON
- Shutter mode select switch : NORM
- White balance select switch: Ⓐ
- TINT: Mechanical center

⑩ **Fuse replacement**
A fuse is provided on the Terminal Ass'y (assembly). Before replacing the fuse, remove the AL Case Ass'y.

■ TWO-SIDE HOLE-THROUGH PC BOARD

A two-sided hole-through PC Board is used on this camera. Patterns and wires are designed extra thin to attain highdensity component mounting. Rough handling may damage the patterns/wires or other components. When disassembling, repairing or adjusting the PC boards, exercise care **to avoid damage.**

■ REPAIRING CIRCUIT BOARD MODULES

(1) Removing circuit board module

Pull out the circuit board, after removing solder completely with a solder sucker.

NOTE:

- Take care not to damage or remove solder from other parts.
- If more than two circuit boards are removed, make sure that they are replaced in the proper position.
- Some circuit boards cannot be removed unless the shielding case and chassis frame hav ebeen removed. When removing any circuit board, check if this applies to the PC board.

(2) Checking circuit board module

To check each circuit board, take out the module and extend with wires, etc.

■ REPLACING CHIP COMPONENTS

Use a soldering iron (temperature 260° ~ 300°C. about 17W) with a slim tip and high insulating ability. those with a solder sucker (about 55W) are usually easier to use.

NOTE: This video camera uses many mini-flat ICs. To remove these, melt the solder while picking up the individual pin with fine tipped tweezers or cut off the IC pins. Take care not to scratch or peel off the BOARD foil pattern.

■ CHIP COMPONENTS DISPLAY

Besides the resistors, short jumpers, FET's, ceramic capacitors, transistors, and other chip components, the chip tantalum capacitors and chip variable resistor (CH VR) are used on the camera. None of these chip components are reusable again once they have been used.

NOTE: 1. Avoid rough handling of the VR.
2. Use a thin-tip insulated-type acrewdriver to adjust the CH VR.

- **How to read printings**

On certain chip components, printing is applied as follows:

① **Chip metal glaze resistor (CH MG R)**

The diagram shown in **Fig. A** Ⓐ is applied to some of these resistors.

Reading method (Example)

1 2 3 = 12 × 10^3 Unit: [Ω]

② **Shorting jumper (O [Ω] of CH MG R)**

No diagram is applied to shorting jumpers. A "0" is printed on Type Ⓐ shown in **Fig. A.**

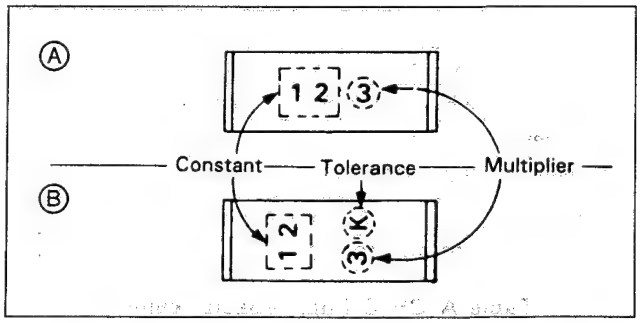


Fig. A Example of CH MG R/CH C Cap. codes

③ **Chip ceramic capacitor (CH C Cap.)**

- The diagram shown in **Fig. A** Ⓑ is applied to some of the CH C Caps. On some others, there is no diagram that is of any use to users.

Reading method (Example)

1 2 3 K = 12 × 10^3 Unit: [PF], Tolerance: K(±10%)

- As shown in **Fig.B** some chip ceramic capacitors are represented by two digits. **Table A** shows how those figures should be read.

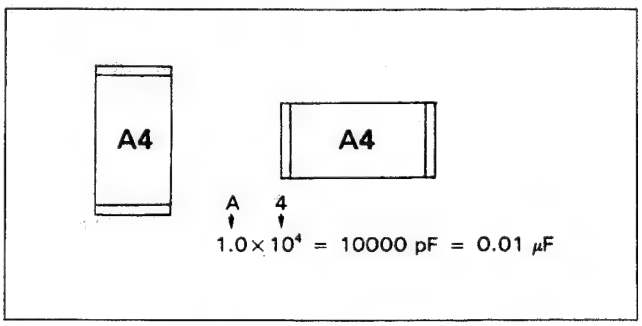


Fig. B Example of CH C Cap.

Alphabet	A	B	C	D	E	F	G	H	J	K
Constant	1.0	1.1	1.2	1.3	1.5	1.6	1.8	2.0	2.2	2.4
Alphabet	L	M	N	P	Q	R	S	T	U	V
Constant	2.7	3.0	3.3	3.6	3.9	4.3	4.7	5.1	5.6	6.2
Alphabet	W	X	Y	Z		a	b	d	e	f
Constant	6.8	7.5	8.2	9.1		2.5	3.5	4.0	4.5	5.0
Alphabet	m	n	t	y						
Contant	6.0	7.0	8.0	9.0						

Numeral	0	1	2	3	4	5	6	7	8	9
Multiplier	10^0	10^1	10^2	10^3	10^4	10^5			10^{-2}	10^{-1}

Table A CH C Cap. capacity value

④ **Chip Variable Resistor (CH VR)**
A two-digit code is printed on some CH VRs. They indicate a reading method, as shown in **Table B**.
Three-digit codes are also used. These codes are read in the same way as those for CH MG R.

⑤ **Chip Tantalum Capacitor (CH Tan. Cap.)**
The diagram shown in **Fig.C** is applied to some of the CH Tan. Caps.
Reading methd (Example)
The type shown in **Fig.C** is 10μF, 16WV chip tantalum capacitor.

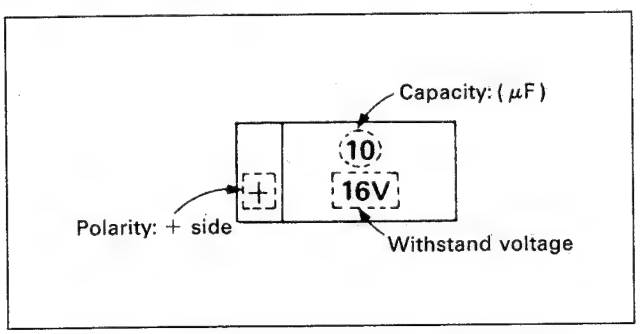


Fig. C Example of CH Tan. C Cap. codes

⑥ **Chip Transistor**
The labels shown in **Table C** are applied to the chip transistor.

Part No.	Display method
2SC2778(B,C,D)	(K)(B) K.C K.D — denotes 2SC2778 parts ranking: B
2SC2404(D)	U.D
2SD601(Q,R)	Y.Q Y.R
2SD601A(Q,R)	Z.Q Z.R
2SD1030(R)	1ZR
2SB709(P,R)	A.P A.Q A.R
2SB792(Q,T)	I.Q I.R I.S I.T
2SB970(Q,S)	1RQ 1RR 1RS
2SA1022(C)	E.C

Table C Chip transistor labels

⑦ **Chip FET**
The following printing is applied to the Chip FET.

Part No.	Display method
2SK198(Q,R)	(10)(Q) 10R — denotes 2SK198 parts ranking: Q
2SK316	1KP 1KQ

Table D Chip FET codes

⑧ **Chip Diode**
The following labels are applied to the Chip Diode.

Part No.	Display method
MA151WA	(M) N — denotes MA151
MA151K	M.H
MA151WK	M.T
MA151A	M.A
MA157	M.R
MA3051	5.1
MA3120 (L-H)	12H 12L 12M

Table E The display of chip diode

Code	12	22	32	52	72	13	23	33	53	73	14
Resistance Value	100 Ω	220 Ω	330 Ω	470 Ω	680 Ω	1k Ω	2.2k Ω	3.3k Ω	4.7k Ω	6.8k Ω	10k Ω

Code	24	34	54	74	15	25	35	55	75	16	
Resistance Value	22 kΩ	33 kΩ	47 kΩ	68 kΩ	100 kΩ	220 kΩ	330 kΩ	470 kΩ	680 kΩ	1 MΩ	

Table B CH VR resistance value display method in two-digit

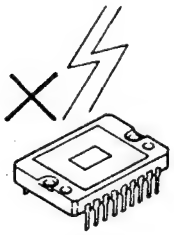
■ "CHARGE COUPLED DEVICE (CCD)" IMAGER

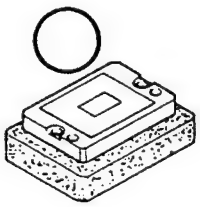
1. Precautions for handling and replacing CCD imager

CCD is characteristic of many advantages, but it also has some disadvantages. The following are measures to deal with these disadvantages.

(1) CCD imager is a circuit element which is very sensitive to static electricity.

- The potential differences caused by the electrostatic charge – which have been accumulated in the clothing and human body – sometimes destruct the insulation of the CCD imager. Therefore, handle the "high-priced" CCD imager with more attention thereto tan to the C-MOS (Complementary MOS), especially during the dry season and in dry places.

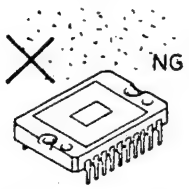


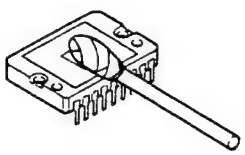


- Maintain the CCD imager in the provided pack or aluminum foil so that it can be kept at the same potential. Never unpack its container until the very moment of servicing.

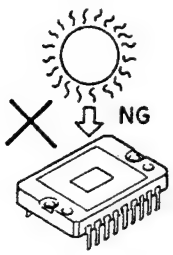
(2) The CCD imager is easily damaged by dust. Also it suffers considerable deterioration, when exposed to strong light.

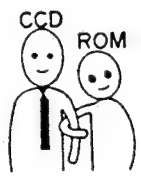
- When servicing, make sure that the CCD imager is kept free from such foreign material as dust. Use dry soft cloth or soft cloth moistured with ethylalcohol to wipe off the foreign material.





- Do not exposed the CCD imager to such strong light as direct sunlight.





(3) The CCD imager is damaged instantly by the following malfunctions. Pay close attention to these malfunctions before servicing.

① After removal of CCD, charge may remain at each terminal in the circuit side for some time. In this situation, when CCD is inserted to the socket, CCD may be distracted instantaneously due to the charge. To avoid this, CCD should be inserted with passage of some time (2 to 3 minutes) after removal.

② The output terminal of the pin (11) is short-circuited.

③ The PD (pre-charged drain bias) terminal of the pin (15) has turned negative.

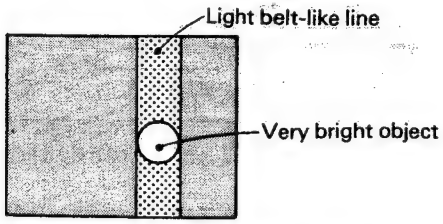
■ SPECIAL CHARACTERISTICS OF A CCD

The following phenomena can be expected when using the video camera with the CCD imager; they are not malfunctions.

- **Smear phenomenon**

This phenomenon occurs when shooting a very bright object (such as electronic light, fluorescent lamp, the sun or a strong reflection).

Video monitor screen



Due to the interline-transfer organization of the CCD image sensors (Refer to "The Interline-transfer Organization of the CCD Image Sensors"), this phenomenon is caused by electronic charges generated beneath the photosensors by a light with a long wavelength, such as an infrared light.

In the shutter mode, as the signal level drops down to 1/20, the smear level becomes high relatively. However, this means no failure.

- **False signal**

When vertical stripes or straight lines are shot, they may look wavy.

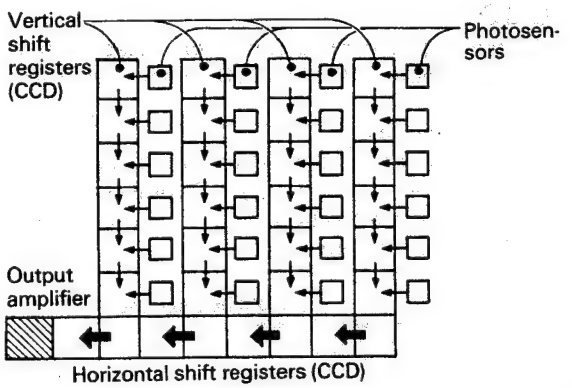
- **Blemishes**

The photosensor elements generate electronic charges which ultimately produce horizontal and vertical rows in the CCD image sensor.

Therefore, any malfunctioning photosensor element will eventually cause a blemish on the monitor screen.

The interline-transfer organization of CCD image sensors

This CCD video camera module adopts an interline transfer organization in which precisely aligned photosensors and vertical shift registers are arrayed interlinearly and horizontal shift resister links up with the vertical shift register, as shown. Light variations are sensed by the photosensors, which generate electronic charges proportional to the light intensity. The generated charges are fed into the vertical shift registers all at one. The charges are then transferred from the vertical shift registers to the horizontal shift registers successively and finally reach the output amplifier to be read out successively.



REMOVING EACH PART

■ Disassembling/Replacing Each Part

- Before disassembling each part, be sure to turn off the power.
- When disassembling or replacing, be sure to attach the dust cap to protect the CCD imager and the optical low pass filter. (Remove the C mount adaptor.)

1-1 Removing the top plate

(1) Remove the four screws ⓐ shown in Fig. 1 and take out the top cover.

1-2 Removing the tripod base

(1) Remove the three screws ⓑ shown in Fig. 1 and take out the tripod base.

1-3 Removing the terminal plate and the rear mold frame

(1) Remove the two screws ⓒ shown in Fig. 1 and take out the terminal plate and the rear mold frame.

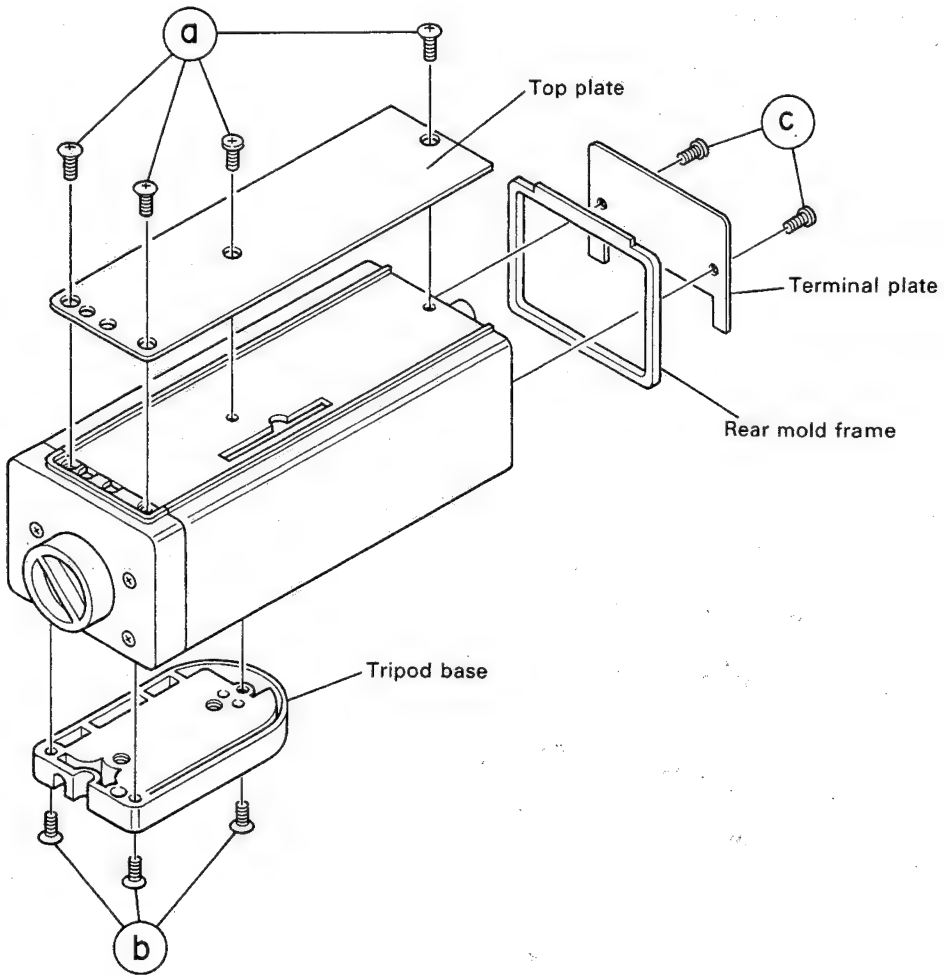


Fig. 1

2-1. Removing the AL case assy

(1) Perform items 1-1 to 1-3.
(2) Remove the two screws ⓙ shown in Fig. 2.
(3) Pull the case in the direction of the arrow ⓚ as shown in Fig. 2, and the AL case assy will be detached.

2-2. Removing the front diecast

(1) Remove the four screws ⓓ shown in Fig. 2 and take out the front diecast.

Notes:

- The front diecast cannot be detached unless the top plate and the tripod base are removed in advance.
- The front diecast cannot be detached with the C mount adaptor kept attached.

2-3. Opening the PC boards

(1) Remove the two screws ⓔ shown in Fig. 2, and the PC boards at the both sides will be opened in the direction of arrow ⓗ. The boards will be detached when further opened.
In addition, when installing them, place them in level with each other and insert their respective connectors to each other. (Push them in fully as shown in Fig. 2-a.)

2-4 Removing the chassis mount

(1) Remove the two screws ⓕ shown in Fig. 2 and take out the chassis mount. (Disconnect the grounding wire and the connectors.)

2-5 Removing the terminal assy

(1) Remove the two screws ⓖ shown in Fig. 2 and take out the terminal assy. (Disconnect the grounding wire and the connectors.)

2-6 Removing the chassis frame

(1) Remove the four screws (1) shown in Fig. 2 and take out the chassis frame.
(2) When the chassis frame is removed, the Mother board can also be removed. (Disconnect the GND wire and connectors before taking the circuit board out.)

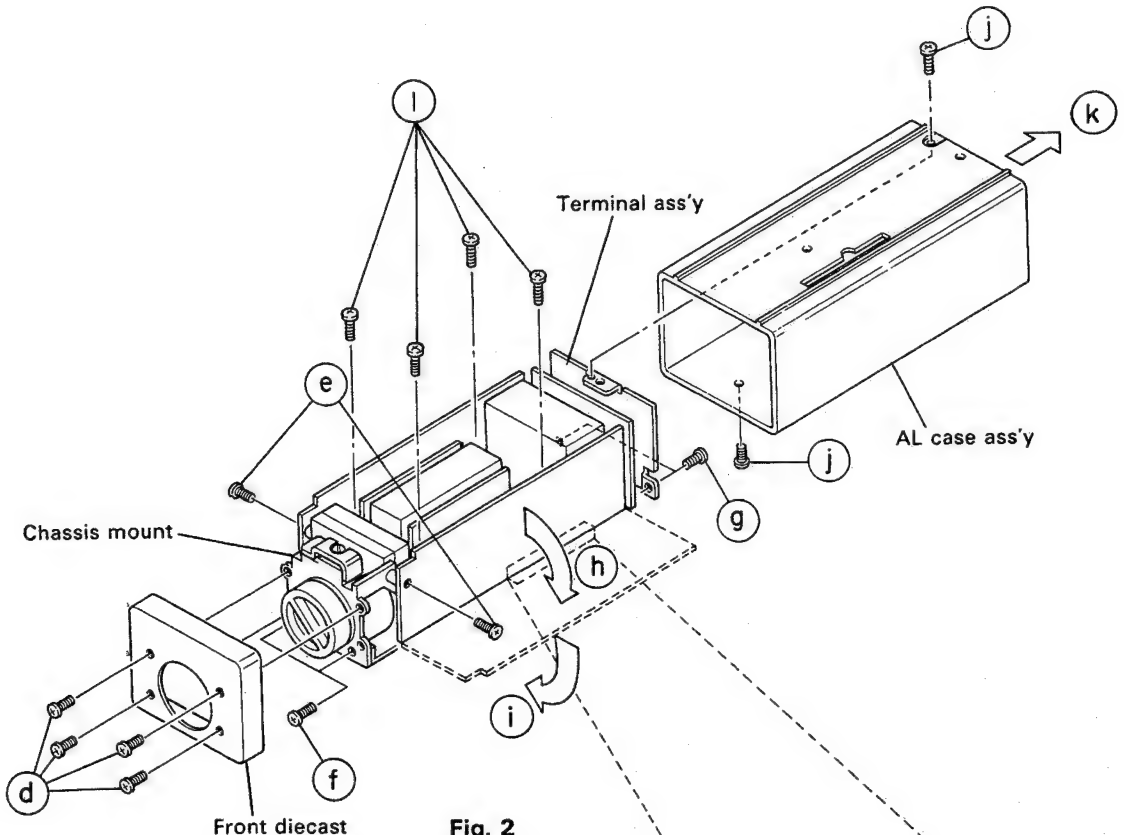


Fig. 2

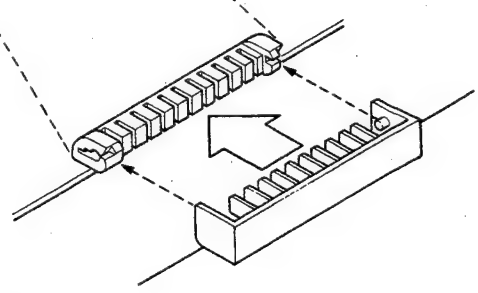


Fig. 2-a

3. Disassembling the CCD imager

(1) Detach the imager section from the chassis in accordance with **"2-4 Removing the chassis mount"**.
(2) Remove the two nuts Ⓐ shown in Fig. 3, and take out the imager board in the direction of the arrow.
(3) Remove the two screws Ⓑ shown in Fig. 3, and the imager holder section and the chassis mount section will be detached.
(4) Remove the two screws Ⓒ shown in Fig. 3, and take out the LPF holder.
(5) Remove the two screws Ⓓ shown in Fig. 3, and take out the CCD imager.
At this time, be careful not to lose the imager mask.

4. Removing the optical low pass filter (OP-LPF assy)

The optical low pass filter can be removed without removing any external parts such as the AL case assy, etc.
Take out the dust cover and remove the two screws Ⓒ shown in Fig. 3, and the LPF holder will be released so that the optical low pass filter can be detached.

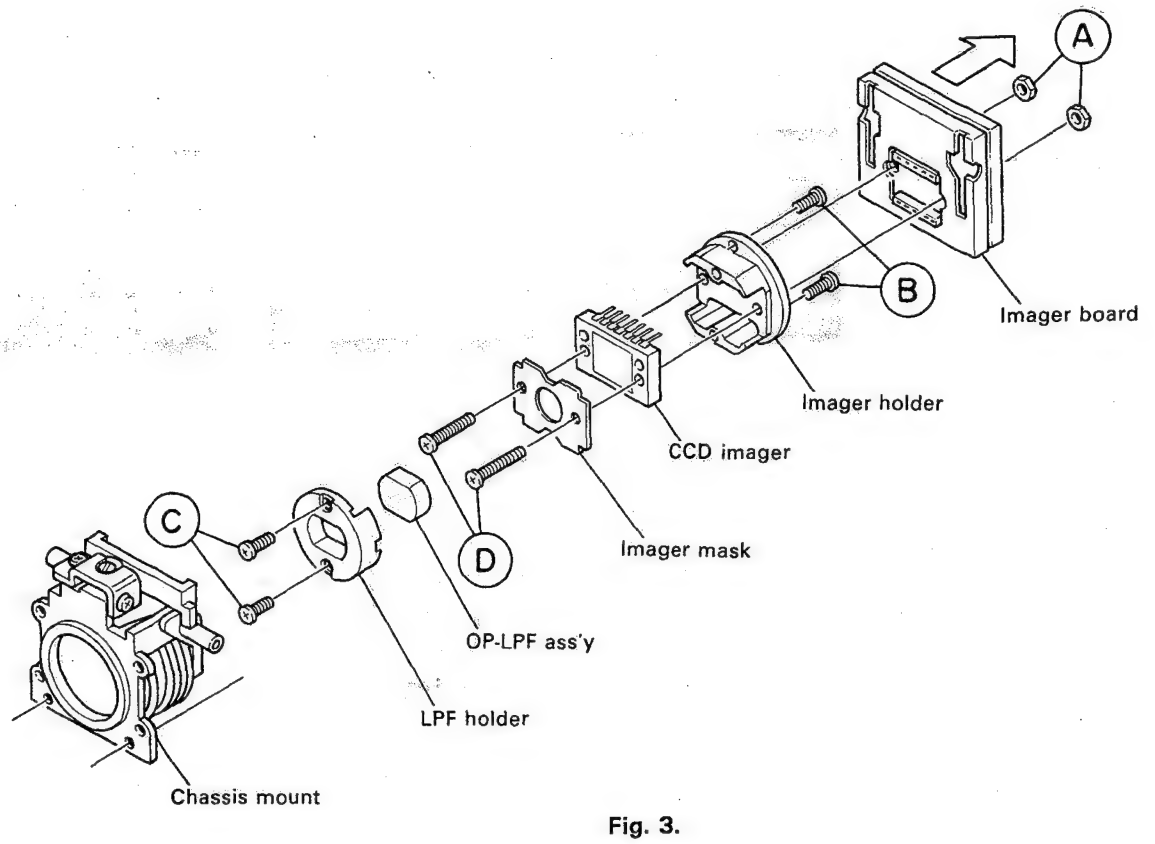


Fig. 3.

2. ADJUSTMENT

MEASURING INSTRUMENTS, TOOLS AND FIXTURES FOR ADJUSTMENT

■ MEASURING INSTRUMENTS

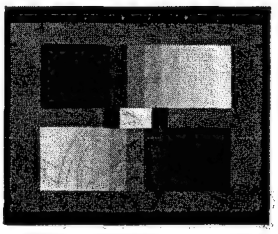
1. **Oscilloscope** 1
2. **Color monitor TV** 1
   Color temperature: 9,300K
3. **Lights** ..... 1 or 2
   Color temperature: 3,200K
4. **Frequency counter** 1
5. **DIGITAL DC voltmeter (DVM)** 1
6. **Power supply** 1
   Voltage: 12 V DC
   VTR power, AC adaptor or AC adaptor + Camera Cable
7. **Vectorscope (PAL-type)** 1
   Used only if necessary.
8. **Waveform monitor (PAL-type)** 1
   Used only if necessary.

■ TOOLS AND FIXTURES

1. Patterns

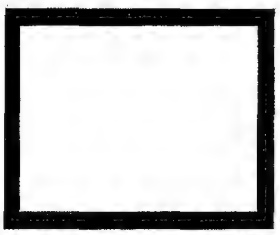
Note:
Reflection-type patterns eventually suffer from drops in signal output level or loss of output uniformity. Periodic replacement is recommended.

(Gray scale pattern)



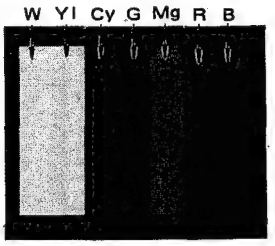
GS-2A*
Reflective type (γ=2.2)

(White pattern)



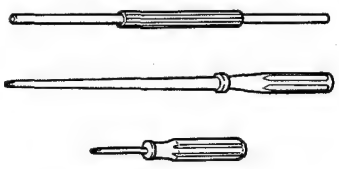
WC-2A*
Reflective type

(Color bar pattern)



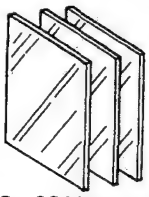
CC-2T*
Transmissive type

2. DRIVERS

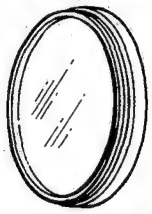


Adj. driver

3. COLOR TEMP. CONVERSION FILTER



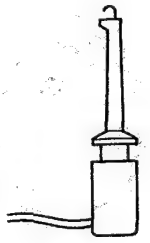
80C + CC10C + CC10B



W10, C8

Kenko, HOYA filter, W10, C8, KODAK Wratten gelatin filter, 80C, CC10C, CC10B

4. PIN CLIP



MJ-033*

Slightly bending the pin tip facilitates its use.

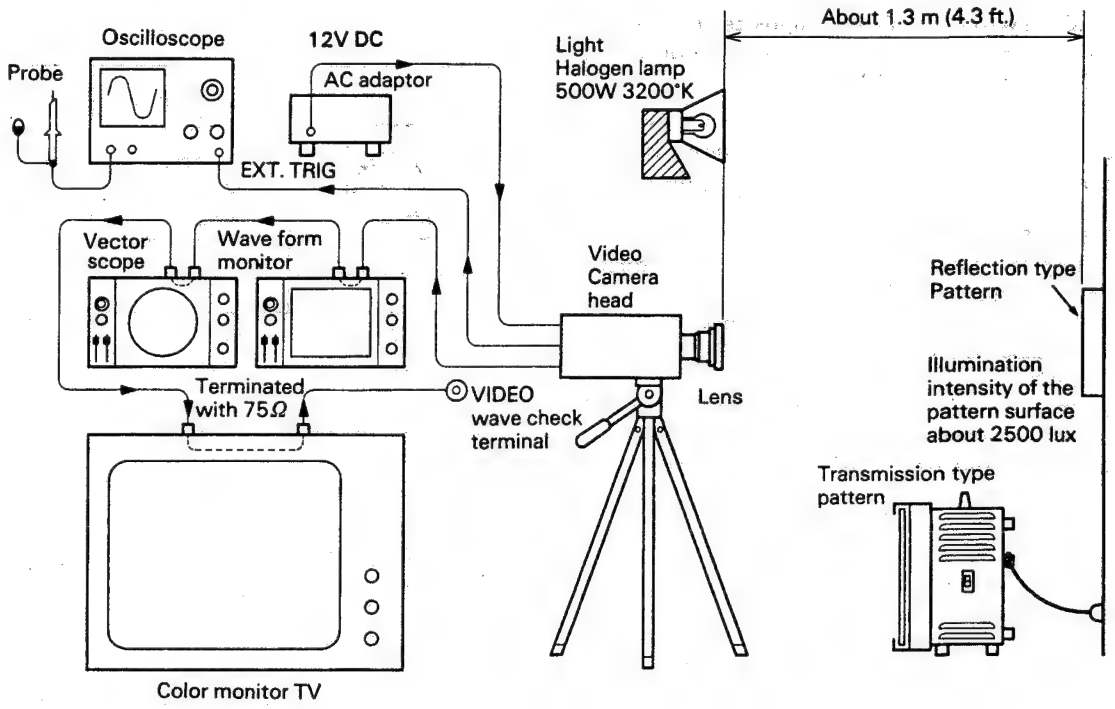
5. LENS

C-mount lens or CS-mount lens. Iris can be controlled manually.

- **Lens flange-back should be standard**
- ***Zoom lens is recommended***
- **F1.4 lens is recommended.**

Note:
Parts marked with an asterisk (*) can be ordered from the following section:
PARTS SECTION OF THESALES ENGINEERING DEPARTMENT, TELEVISION RECEIVER DIVISION.
Parts that is not marked with asterisk (*) are able to get at your side.

INSTRUMENT CONNECTION AND SETUP



PRIOR TO STARTING ADJUSTMENT

(1) Warming up

Before adjustment, turn on the camera to warm it up for more than 10 minutes so that the camera operation may be stabilized.

(2) Lighting

- Adjust the distance between the light and pattern so that the illumination on the pattern is about 2,500 lux and the illumination over the entire pattern surface is as uniform as possible.
- Correct adjustment will be impossible if the illumination is too high, too low or uneven.

(3) About CCD Imager

The CCD image is susceptible to static electricity. The insulator of this element might be damaged if a potential difference is caused by the electrostatic charge carried by clothes or body. Be careful when holding it because it is costly. Use special care in a dry atmosphere in a dry season.

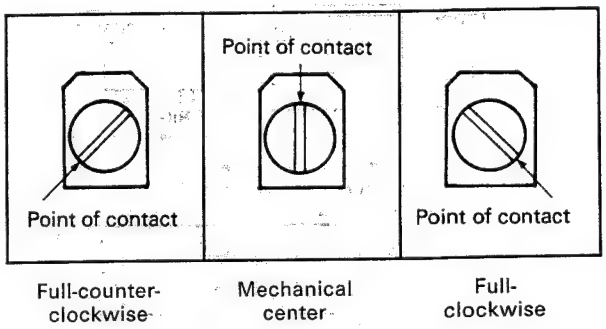
ADJUSTMENT PROCEDURES

1. **Presetting**
   Before adjustment, preset the following switches:

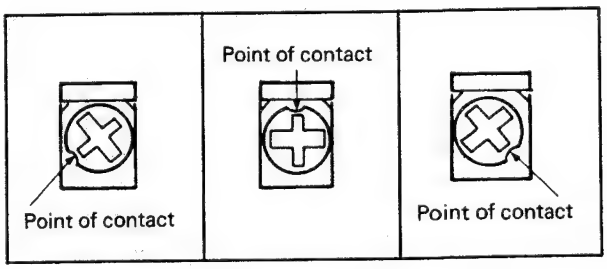
   1) TINT VR → Mechanical center
   2) AGC switch → "OFF" (opposite to lens)
   3) White Balance switch → "☀" (in-door)
   4) SHUTTER → "NORM" (OFF)

2. In holding a test pin with a probe, take care set contact with any other pin. The CCD imager will be damaged if some text pins are accidentally connected.
3. **EXT. TRIGGER**
   In adjusting the signal system, extract the trigger signal as required.
   H-rate: TP-26 (ID) [PROCESS Board]
   V-rate: Module C, Pin ⑨ [SSG Board]
4. **JUST SCAN**
   Unless otherwise specified, apply "just scan" to all pattern adjustments.
5. **Repeat adjustments** optimum conditions are established.

6. **Chip VR**
   Chip VR rotating position is designated as shown in the figure below for the convenience of explanation, since the chip VR can be rotated 360°.



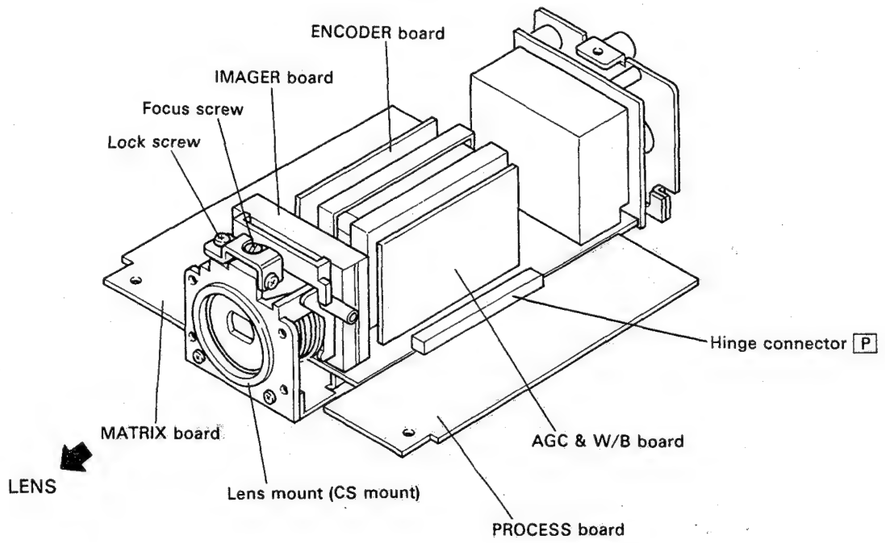
Full-counter-clockwise | Mechanical center | Full-clockwise

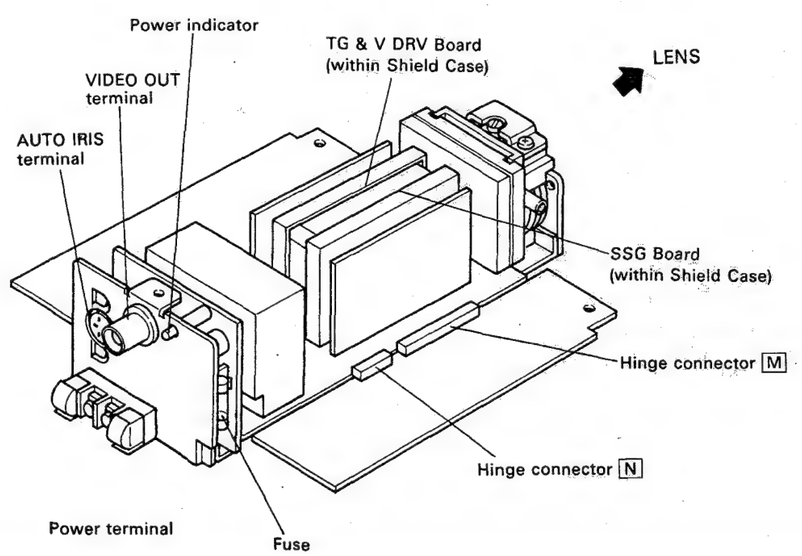


Full-counter-clockwise | Mechanical center | Full-counterclockwise

7. **No Adjustment of unspecified VRs**
   Never rotate VR's other than those specified by this Instruction Manual.

MAIN PARTS ARRANGEMENT AND LOCATIONS OF BOARDS





ADJUSTING STEP

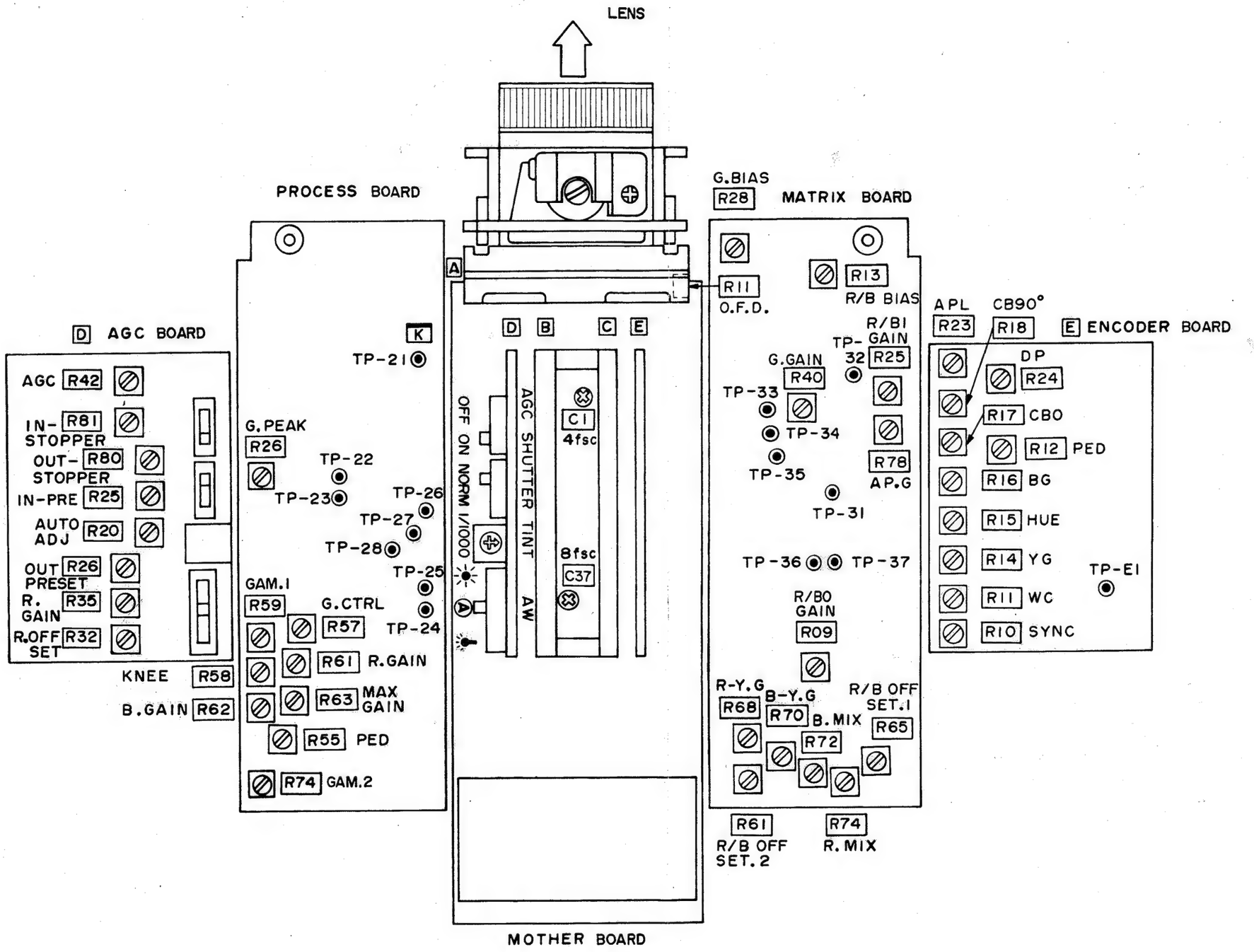
1. SSG (Synchronous Signal Generator) adjustment
Note: Normally, this adjustment is not necessary. Proceed to the next "Signal system adjustments" directly.

8fsc & 4fsc adjustment
↓
Signal system adjustments

2. Signal system adjustments

1 Preset
2 Overflow drain adjustment
3 INDOOR white balance voltage adjustment
4 MAX. GAIN adjustment
5 GAMMA. 2 adjustment
6 GREEN DET OUT adjustment
7 GAMMA adjustment
8 KNEE adjustment
9 R/Bo gain adjustment
10 BIAS-1 (R/B) adjustment
11 BIAS-2 (G) adjustment
12 G. GAIN adjustment
13 MPX OFFSET adjustment
14 R/B1 GAIN adjustment
15 SYNC LEVEL adjustment
16 Y SETUP 1 adjustment
17 Y GAIN adjustment
18 WHITE CLIP adjustment
19 CARRIER BALANCE adjustment
20 HUE & BURST GAIN adjustment
21 APACON LEVEL adjustment
22 V. CONTOUR adjustment
23 WHITE BALANCE adjustment 1 (INDOOR)
24 WHITE BALANCE adjustment 2 (OUTDOOR)
25 WHITE BALANCE adjustment 3 (STOPPER1)
26 WHITE BALANCE adjustment 4 (AUTO)
27 WHITE BALANCE adjustment5 (STOPPER 2)
28 G CLIP adjustment (G PEAK)
29 AGC START POINT adjustment
30 Y SETUP 2 adjustment
31 AGC DEPENDENT adjustment
32 COLOR REPRODUCTION adjustment
33 BACK FOCUS adjustment
34 FINAL CHECK

ADJUSTMENT LOCATION



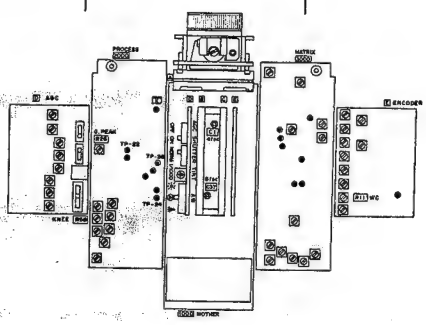
1. SSG ADJUSTMENT

No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
1.	8fsc & 4fsc adjustment				

This adjustment should be performed only when the SSG IC or a peripheral unit required for adjustment is replaced.

- **Normally, this adjustment is unnecessary. Proceed directly to "2. SIGNAL SYSTEM ADJUSTMENTS" directly.**

Frequency counter	Module [C], Pin ⑪	C01 (4fsc) C02 (4fsc-2) (within shield case)
DC voltmeter	Module [C], Pin ⑳ [SSG Board]	C37 (8fsc)



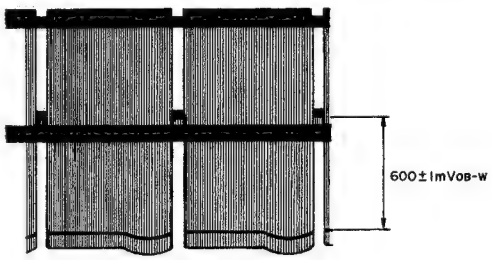
1. While measuring the frequency at **pin ⑪ of Module [C]**, adjust **C01 (4fsc)** so that the frequency counter reads **17.734475 MHz ±10 Hz.**
2. When measuring the voltage at **pin ⑳ of Module [C]**, adjust **C37** so that the DC voltmeter reads **2.5 V ± 0.1V.**

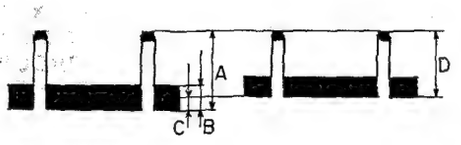
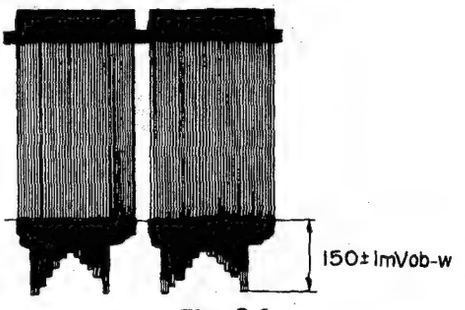
Note: In the above adjustment, when the required frequency is not obtained, perform the following adjustment:

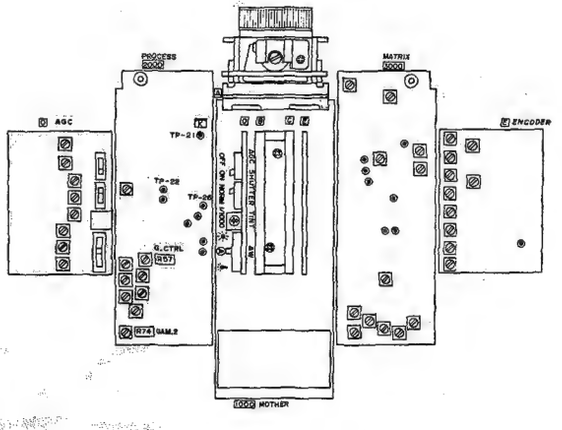
1. Set **C01 (4fsc)** to the center.
2. While measuring the frequency at **pin ⑪ of Module [C]**, adjust **C02 (4fsc-2)** in the shielded case so that the frequency counter reads **17.734475 MHz ±10 Hz.**
3. While measuring the voltage at **pin ⑳ of Module [C]**, adjust **C37 (8fsc.)** so that the DC voltmeter reads **2.5 V ± 0.1 V.**

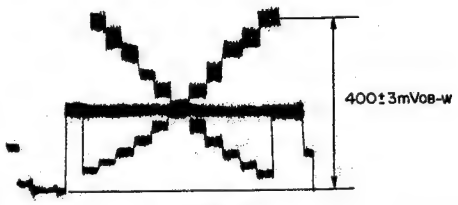
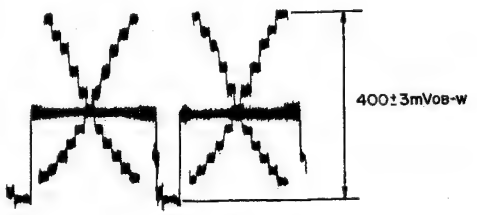
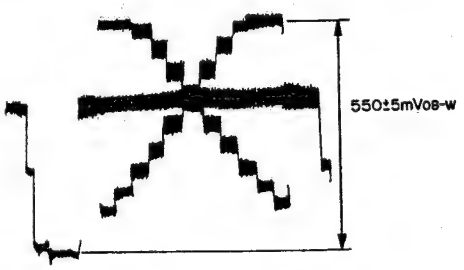
2. SIGNAL SYSTEM ADJUSTMENTS

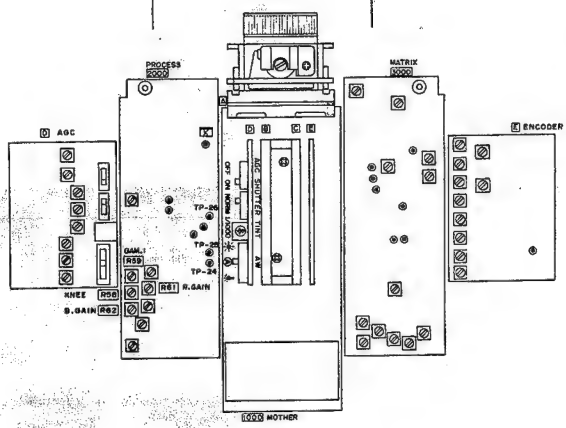
No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
1.	PRESET	Oscilloscope [H-rate 10:1] Gray scale pattern	TP-24 [PROCESS Board] TP-22 [PROCESS Board] VIDEO OUT ● EXT TRIGGER, TP-26 (ID) [PROCESS Board]	R58 (KNEE) R26 (G. PEAK) [PROCESS Board] R11 (W.C) [ENCODER Board]	Before adjustment, preset the following items: 1) **TINT VR** → Mechanical center 2) **AGC switch** → OFF 3) **White balance select switch** → ☀ (INDOOR) 4) **SHUTTER mode select switch** → "NORM" (OFF) Open the iris sufficiently. ■ KNEE cancel While observing the waveform at **TP-24**, adjust **R58 (KNEE)** so that its amplitude is maximized. ■ W. CLIP cancel While observing the waveform at **VIDEO OUT**, adjust **R11 (W.C)** so that its amplitude is maximized. ■ G. CLIP cancel While observing the waveform at **TP-22**, adjust **R26 (G. PEAK)** so that its amplitude is maximized.

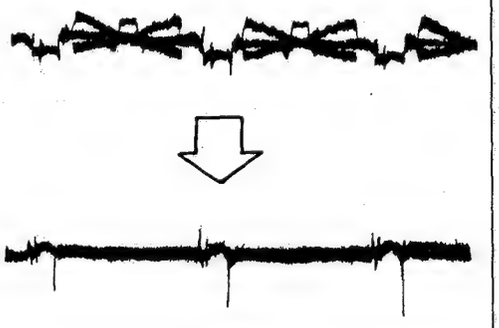
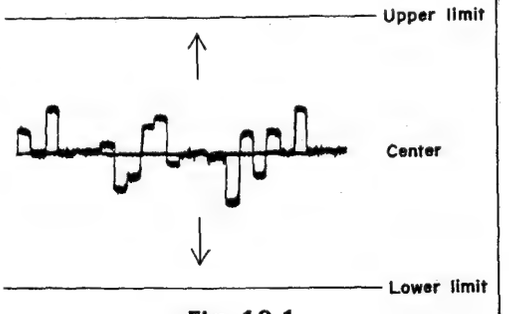
No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
2.	OVER-FLOW DRAIN adjustment	Oscilloscope (V-rate 10:1) White pattern	● EXT TRIGGER Pin ⑨ Module C [SSG Board] TP-21 [PROCESS Board]	R11 (O.F.D) [IMAGER Board]	● Open the iris sufficiently. 1. Approach a light (3200°K) to the white pattern, and adjust so that the illumination on the pattern surface is **10000~20000 lux.** (1kW halogen lamp is used. The distance between the pattern and the lamp light is about 60 cm.) At this time, pay attention to the white pattern luminance slope. 2. While observing the waveform at **TP-21**, adjust **R11 (O.F.D)** so that the waveform is **600 ±1 mVob-w. (Fig. 2-1)** **NOTE:** When the maximum waveform is not more than **620 mVob-w**, the quantity of light is not sufficient.  **Fig. 2-1**
3	INDOOR WHITE BALANCE VOLTAGE adjustment	DC voltmeter	TP-27 [PROCESS Board] or pin ⑬ of hinge connector P Pin ⑭ of hinge connector P	R32 (R. OFFSET) R25 (IN-PRE) [AGC Board]	1. Set the **TINT VR** to the mechanical center. 2. While measuring the voltage at **TP-27** or **pin ⑬ of hinge connector P** by the DC voltmeter, adjust **R32 (R. OFFSET)** so that its reading is **2.35±0.005 V.** 3. While measuring the voltage at **pin ⑭ of hinge connector P** by the DC voltmeter, adjust **R25 (IN-PRE)** so that its reading is **2.7±0.005 V.**
4.	MAX. GAIN adjustment	DC voltmeter	TP-28 [PROCESS Board]	R63 (MAX. GAIN) [PROCESS Board]	1. While measuring the voltage at **TP-28** by the DC voltmeter, adjust **R63 (MAX. GAIN)** so that its reading is **2.65±0.01 V.**

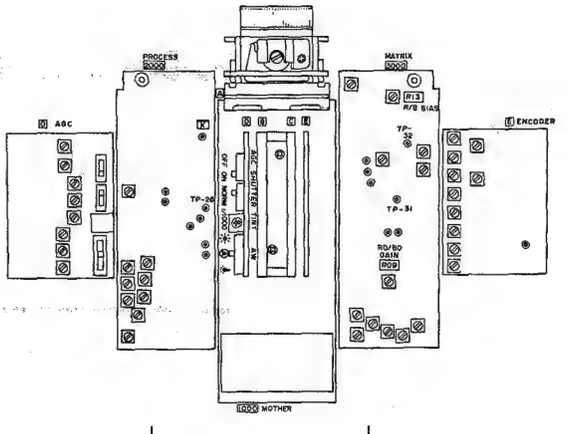
No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
5	GAMMA2 adjustment	Oscilloscope (H-rate 10:1)	Pin ⑪ of IC02 [PROCESS Board] ● EXT TRIGGER TP-26 (ID) [PROCESS Board]	R74 (GAM2) [PROCESS Board]	● Close the iris with the lens cap. 1. Measure the voltage **pin at ⑪ of IC02,** and adjust so that the amplitude of the waveform of **R74 (GAM 2)** becomes maximum (A), as shown in **Fig. 5-1.** 2. Adjust **R74 (GAM 2)** so that the amplitude at section (C) becomes half the level of (B) as shown in **Fig.5-1.**  $C=\frac{B}{2}$ ⇨ D=A-C **Fig. 5-1**
6.	GREEN DET OUT adjustment	Oscilloscope (H-rate 10:1) Gray scale Pattern	TP-21 (CCD OUT) TP-22 (GDET OUT) [PROCESS Board] ● EXT TRIGGER TP-26 (ID) [PROCESS Board]	R57 (G.CTRL) [PROCESS Board]	■ **Standard iris setting** ● While observing the waveform at **TP-21,** adjust the iris control knob (lens side) so that the **CCD OUT waveform** is **150±1 mVob-w** as shown in **Fig. 6-1.**  **Fig. 6-1** 1. While observing the waveform at **TP-22,** adjust **R57 (G. CTRL)** so that the waveform is **300±1 mVob-w** as shown in **Fig. 6-2.**  **Fig. 6-2**

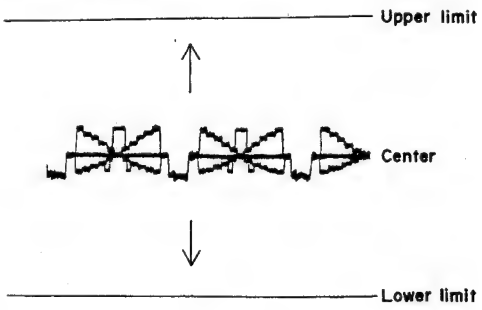
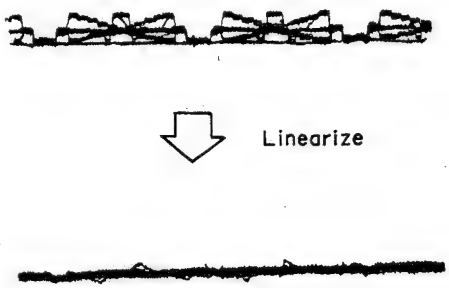


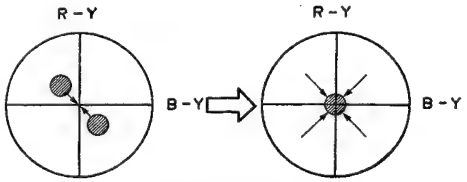
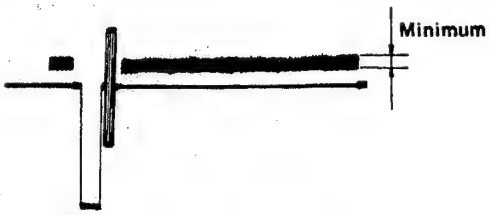
No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
7.	GAMMA adjustment	Oscilloscope [H-rate 10:1] Gray scale pattern	TP-24 (G GAMMA OUT) TP-25 (R/B GAMMA OUT) [PROCESS Board] ● EXT TRIGGER TP-26 (ID), [PROCESS Board]	R59 (GAM 1) R61 (R.GAIN) R62 (B. GAIN) [PROCESS Board]	■ Standard iris setting ● While observing the waveform at **TP-21** by the oscilloscope, adjust the iris control knob (lens side) so that the **CCD OUT waveform is 150 V±1 mVob-w.** 1. While observing the wavefrom at **TP-24** by the oscilloscope, adjust **R59 (GAM 1)** so that the waveform is **400 ±3 mVob-w** as shown in **Fig. 7-1.**  **Fig. 7-1** 2. While observing the waveform at **TP-25**, adjust **R61 (R. GAIN) and R62 (B. GAIN)** so that their respective associated waveforms are **400±3mVob-w** as shown in **Fig. 7-2.** (Match the waveforms at **TP-24** and **TP-25** in level.)  **Fig. 7-2**
8.	KNEE adjustment	Oscilloscope [H-rate 10:1] Gray scale pattern	● EXT TRIGGER TP-26 (ID), [PROCESS Board] TP-24 (G GAMMA OUT) [PROCESS Board]	R58 (KNEE) [PROCESS Board]	● Open the iris sufficiently. 1. While observing the waveform at **TP-24**, adjust **R58 (KNEE)** so that the waveform is **550±5mVob-w** as shown in **Fig. 8-1.** **Note:** When the waveform at TP-24 is not more than 600 mV even with the iris opend, the illumination is not sufficient.  **Fig. 8-1**

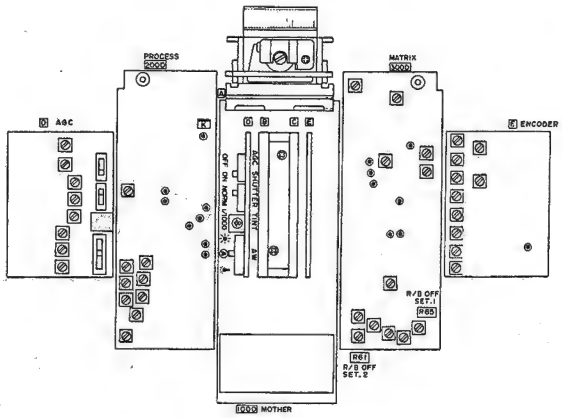


No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
9.	R/Bo GAIN adjustment	Oscilloscope [H-rate 10:1] Gray scale pattern	● EXT TRIGGER TP-26 (ID), [PROCESS Board] TP-31 [MATRIX Board]	R09 (R/Bo GAIN) [MATRIX Board]	■ Standard iris setting ● While observing the waveform at **TP-21**, adjust the iris control knob (lens side) so that the **CCD OUT waveform** is **150±1mVob-w**. 1. While observing the waveform at **TP-31**, adjust **R09 (R/Bo GAIN)** so that the waveform is linear as shown in **Fig. 9-1**.  **Fig. 9-1**
10.	BIAS-1 (R/B) adjustment	Oscilloscope [H-rate 10:1] Color bar pattern	● EXT TRIGGER TP-26 (ID), [PROCESS Board] TP-32 [MATRIX Board]	R13 (R/B BIAS) [MATRIX Board]	■ Standard iris setting ● While observing the waveform at **TP-21**, adjust the iris control knob (lens side) so that the **CCD OUT waveform** is **150±1mVob-w**. 1. While observing the waveform at **TP-32**, raise and lower the waveform by **R13 (R/B BIAS)** to adjust so that the waveform comes to the center between the upper and lower limit positions as shown in **Fig. 10-1**.  **Fig. 10-1**

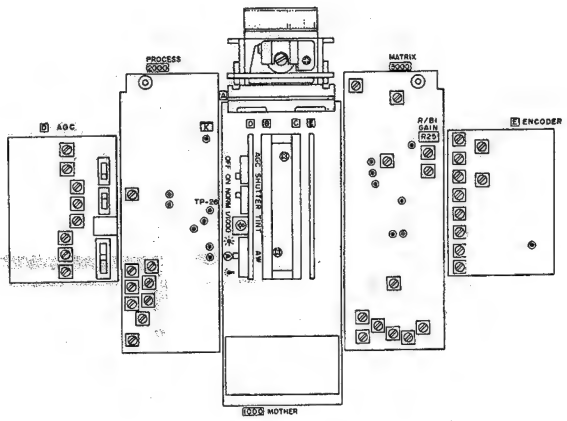


No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
11.	BIAS-2 (G) adjustment	Oscilloscope (H-rate 10:1) Gray scale pattern	● EXT TRIGGER TP-26 (ID), [PROCESS Board] TP-33 [MATRIX Board]	R28 (G. BIAS) [MATRIX Board]	■ Standard iris setting ● While observing the waveform at TP-21, adjust the iris control knob (lens side) so that the CCD OUT waveform is 150±1mVob-w. 1. While observing the waveform at TP-33, raise and lower the waveform by R28 (G. BIAS) to adjust so that the waveform comes to the center between the upper and lower limit positions as shown in Fig. 11-1.  Fig. 11-1
12.	G. GAIN adjustment	Oscilloscope (V-rate 10:1) Gray scale pattern	● EXT TRIGGER pin ⑨ of Module C (SSG) TP-35 [MATRIX Board]	R40 (G. GAIN) [MATRIX Board]	■ Standard iris setting ● While observing the waveform at TP-21, adjust the iris control knob (lens side) so that the CCD OUT waveform is 150±1mVob-w. 1. While observing the waveform at TP-35, adjust R40 (G. GAIN) so that the waveform is linear as shown in Fig. 12-1.  Fig. 12-1

No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
13.	MPX OFFSET adjustment	Vectorscope Oscilloscope [H-rate 10:1]	VIDEO OUT	R65 (R/B OFF SET1) R61 (R/B OFF SET2) [MATRIX Board]	[When using the Vectorscope] ● Close the iris with the lens cap. 1. While observing the waveform at **VIDEO OUT**, adjust **R65 (R/B OFFSET 1)** and **R61 (R/B OFFSET 2)** so that the carrier is centered and minimized as shown in **Fig. 13-1**.  **Fig. 13-1** [When using the Oscilloscope] ● Close the iris with the lens cap. 1. While observing the waveform at **VIDEO OUT**, adjust **R65 (R/B OFFSET 1)** and **R61 (R/B OFFSET 2)** so that the carrier is minimized as shown in **Fig. 13-2**.  **Fig. 13-2**



No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
14.	R/B1 GAIN adjustment	Vectorscope Oscilloscope (H-rate 10:1) Color bar pattern	VIDEO OUT ● EXT TRIGGER TP-26 (ID), [PROCESS Board]	R25 (R/B1 GAIN) [MATRIX Board]	**[When using the Vectorscope]** ● Take the color bar pattern and set the carrier to the R ⊞ position by the iris control knob. 1. While observing the waveform at **VIDEO OUT**, adjust **R25 (R/B1 GAIN)** with separate carrier balls so that each pair of carrier balls are unified to one as shown in **Fig. 14-1**.



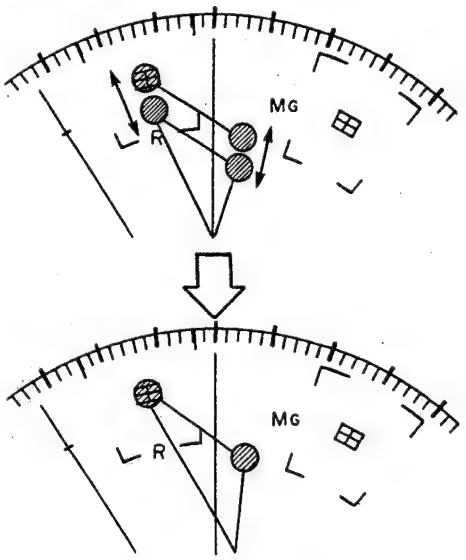
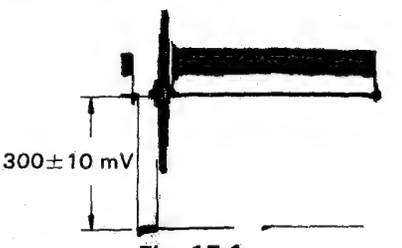
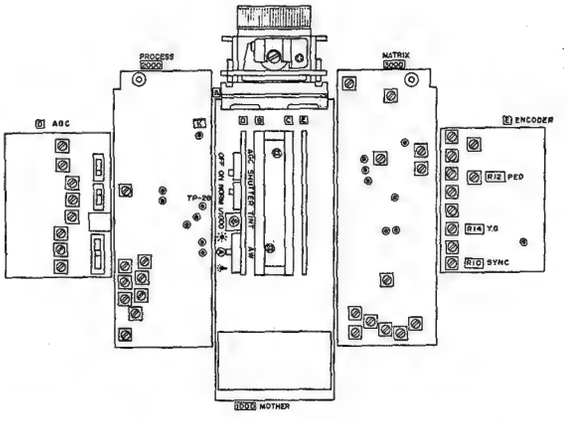
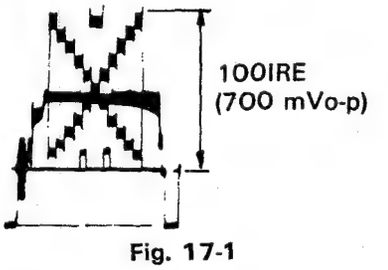
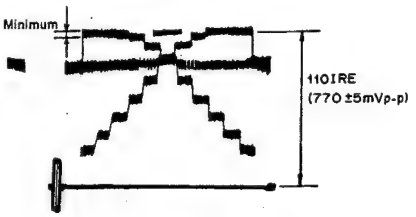
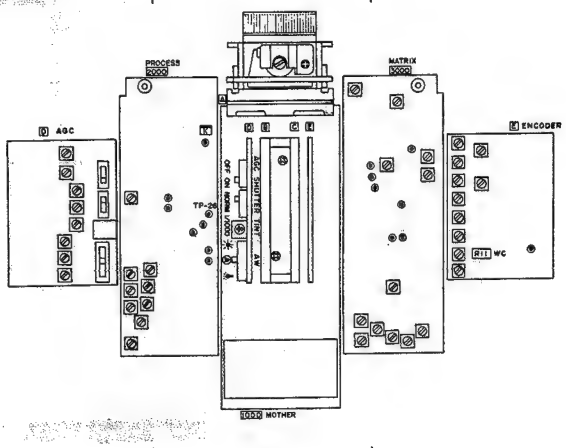


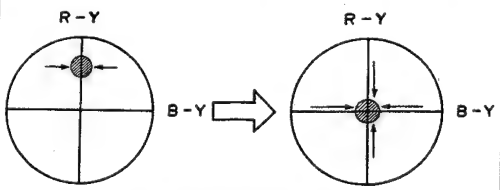
Fig. 14-1

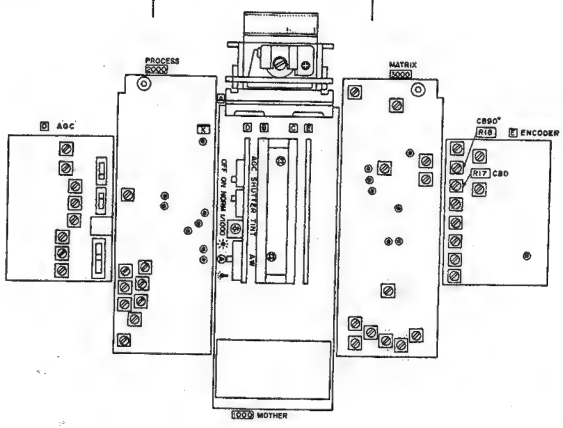
[When using the Oscilloscope]
● Take the color bar pattern and set the white signal to **700mV** by the iris control knob.
1. While observing the waveform at **VIDEO OUT**, adjust **R25 (R/B1 GAIN)** so that the waveform swing is minimized.

No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
15.	SYNC LEVEL adjustment	Oscilloscope [H-rate 10:1]	VIDEO OUT	R10 (SYNC) [ENCODER Board]	● Close the iris with the lens cap. 1. While observing the waveform at **VIDEO OUT**, adjust **R10 (SYNC)** so that the sync level is **300±10mV** as shown in **Fig. 15-1**.  **Fig. 15-1**
16.	Y SETUP 1 adjustment	Oscilloscope [H-rate 10:1]	VIDEO OUT	R12 (PED) [ENCODER Board]	● Close the iris with the lens cap. 1. While observing the waveform at **VIDEO OUT**, adjust **R12 (PED)** so that the setup level is **50±3mV** as shown in **Fig. 16-1**.  **Fig. 16-1** 
17.	Y GAIN adjustment	Oscilloscope [H-rate 10:1] Gray scale pattern	● EXT TRIGGER TP-26 (ID), [PROCESS Board] VIDEO OUT	R14 (YG) [ENCODER Board]	■ **Standard iris setting** ● While observing the waveform at **TP-21**, adjust the iris control knob (lens side) so that the **CCD OUT waveform** is **150±1mVob-w**. 1. While observing the waveform at **VIDEO OUT**, adjust **R14 (YG)** so that the waveform is **100 IRE (700 mVo-p)** as shown in **Fig. 17-1**.  **Fig. 17-1**

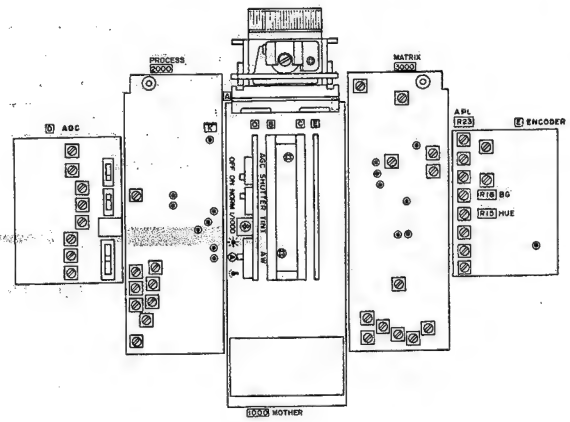
No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
18.	**WHITE CLIP adjustment**	**Oscilloscope** (H-rate 10:1) **Gray scale Pattern**	● **EXT TRIGGER TP-26 (ID), [PROCESS Board]** **VIDEO OUT**	**R11 (WC) [ENCODER Board]**	● Open the iris sufficient;y. 1. While observing the waveform at **VIDEO OUT**, adjust **R11 (WC)** so that the waveform is **110 IRE (770±5mVp-p)** as shown in **Fig. 18-1**.  **Fig. 18-1**



No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
19.	CARRIER BALANCE adjustment	Vectorscope Oscilloscope (H-rate 10:1) Color bar Pattern	VIDEO OUT	R17 (CB0) R18 (CB 90) [ENCODER Board]	[When using the Vectorscope] ● Close the iris with the lens cap. 1. Set the carrier to on the R-Y axis by **R17 (CB0)** as shown in **Fig. 19-1**. 2. Adjust **R18 (CB90)** so that the carrier comes to the intersecting point between the R-Y axis and the B-Y axis.  **Fig.19-1** [When using the Oscilloscope] ● Close the iris with the lens cap. 1. While observing the waveform at **VIDEO OUT**, adjust **R17 (CB0)** and **R18 (CB90)** so that the carrier is minimized as shown in **Fig. 19-2**.  **Fig. 19-2**



No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
20.	HUE & BURST GAIN adjustment	Vectorscope	VIDEO OUT	R16 (BG) R15 (HUE) [ENCODER Board]	● Close the iris by applying the lens cap. 1. Adjust **R15 (HUE)** so that the BURST becomes PAL BURST POSITION. 2. Adjust **R16 (BG)** so that the BURST LEVEL is set at the **75%** shown in **Fig. 20-1**.
21.	APACON LEVEL adjustment	Oscilloscope [H-rate 10:1] Gray scale pattern	VIDEO OUT	R23 (APL) [ENCODER Board]	● Set the **VIDEO OUT** level to **80 IRE (560±15mV)** by the iris control knob (lens side). **NOTE:** Focus the lens accurately. If the lens is out of focus, the overshoot wave does not appear clearly. 1. Adjust **R23 (APL)** so that the overshoot quantity of the white peak at the gray scale center is **15 IRE (105±15mV)** as shown in **Fig. 21-1**.



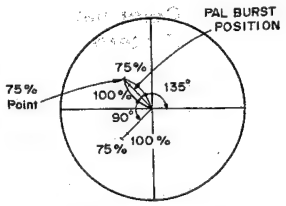


Fig. 20-1

Notes
1. The **BURST POSITION** adjustment can only be performed with a vectorscope.
2. A rough adjustment of BURST GAIN is possible also with an oscilloscope.

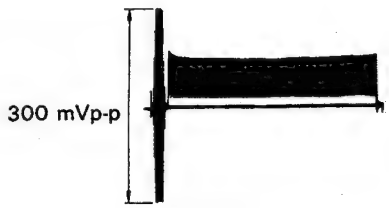


Fig. 20-2

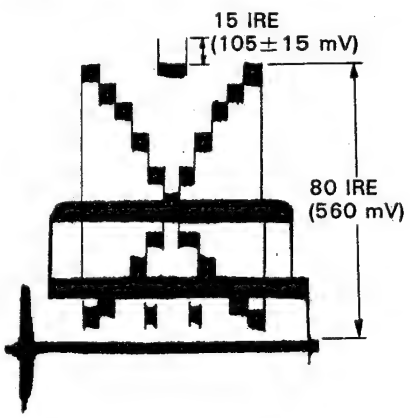
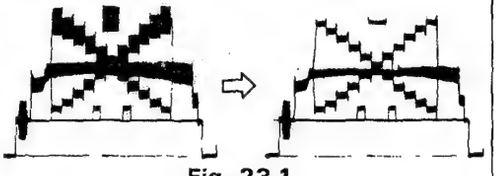
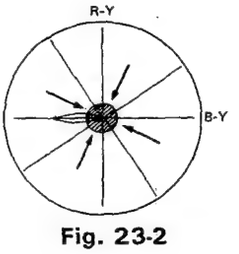
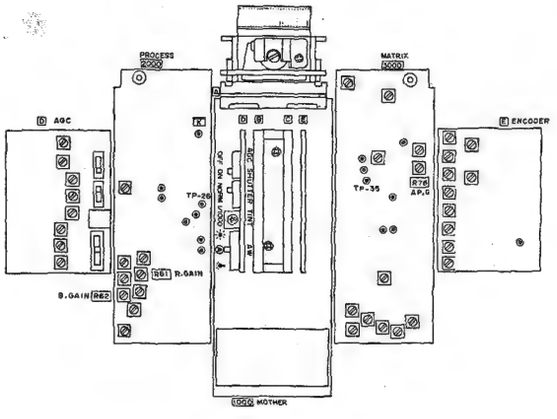
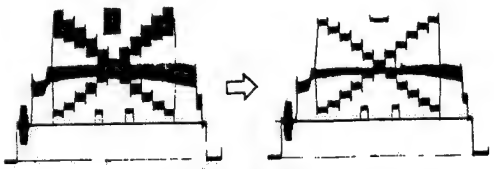
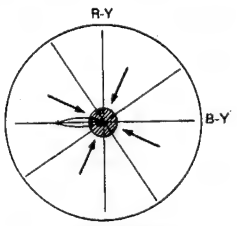
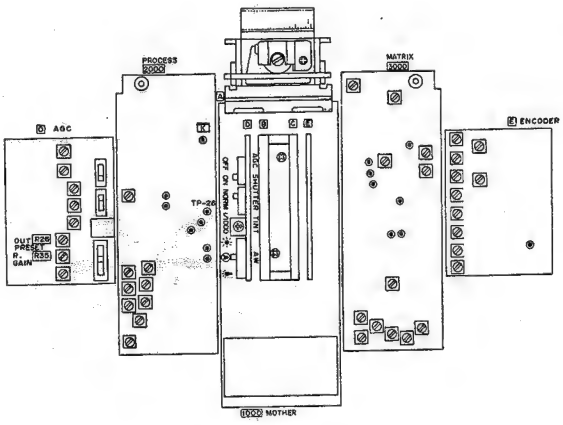


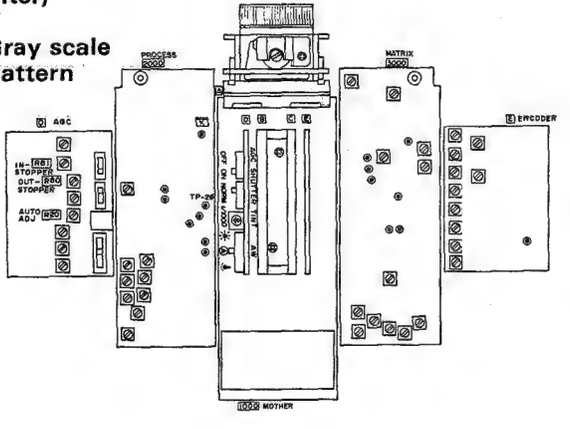
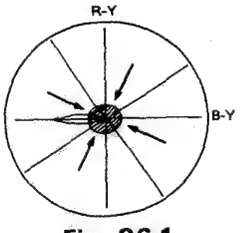
Fig. 21-1

No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
22.	V. CONTOUR adjustment	Oscilloscope (V-rate 10:1) Gray scale pattern	● TP-35 [MATRIX Board]	R78 (AP.G) [MATRIX Board]	● Set the VIDEO OUT level to 80 IRE (560 mV) by the iris control knob (lens side). ● Let make the central section (white) of the gray scale close-up. ● Focus the lens accurately. 1. Adjust R78 (AP. G) so that the over-shoot quantity of the white peak is 250±1mVp-p as shown in Fig. 22-1.  Fig. 22-1
23.	WHITE BALANCE adjust-ment 1 (INDOOR)	Oscilloscope (H-rate 10:1) Vectorscope Gray scale pattern	VIDEO OUT ● EXT TRIGGER TP-26 (ID), [PROCESS Board]	R61 (R.GAIN) R62 (B.GAIN) [PROCESS Board]	[When using the Oscilloscope] ● Set the VIDEO OUT level to 100 IRE (700 mV) by the iris control knob (lens side). 1. Check that the whitel balance switch is set to "☀" (INDOOR). 2. Adjust R61 (R. GAIN) and R62 (B. GAIN) so that the carrier for the mid-dle tone section of the gray scale is minimized as shown in Fig. 23-1.  Fig. 23-1 [When using the Vectorscope] ● Set the VIDEO OUT level to 100 IRE (700 mV) by the iris control knob (lens side). 1. Check that the white balance switch is set to "☀" (INDOOR)). 2. Adjust R61 (R. GAIN) and R 62 (B. GAIN) so that the carrier is minimized and comes to the center of the vector-scope as shown in Fig. 23-2.  Fig. 23-2

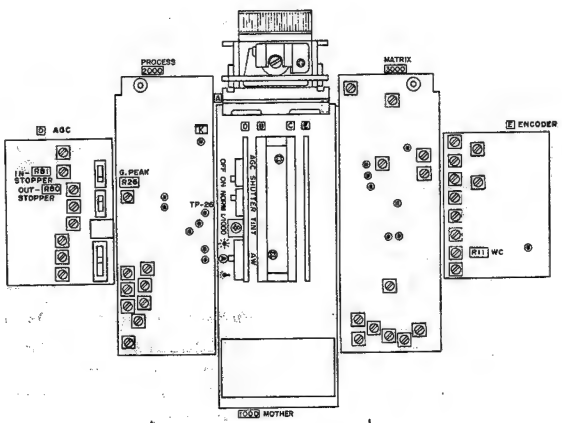


No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
24.	**WHITE BALANCE adjustment 2 (OUTDOOR)**	**Oscilloscope** (H-rate 10:1) **Color temperature conversion filter 80C+ CC10C+ CC10B** **Vectorscope** **Gray scale pattern**	● **EXT TRIGGER TP-26 (ID), [PROCESS Board]** **VIDEO OUT**	**R26 (OUT PRESET) R35 (R.GAIN) [AGC Board]**	● Set the **VIDEO OUT** level to **100 IRE (700 mV)** by the iris control knob (lens side). ● Set the white balance switch to "☀" **(OUTDOOR)**. ● Install the filter to the lens front. **[When using the Oscilloscope]** 1. Adjust **R26 (OUT PRESET)** and **R35 (R. GAIN)** so that the carrier for the middle tone section of the gray scale is minimized as shown in **Fig. 24-1**.  **Fig. 24-1** **[When using the Vectorscope]** 1. Adjust **R26 (OUT PRESET)** and **R35 (R. GAIN)** so that the carrier is minimized and comes to the center of the vectorscope as shown in **Fig. 24-2**.  **Fig. 24-2**



No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
25.	**WHITE BALANCE adjustment 3 (STOPPER 1)**	**DC voltmeter** **Gray scale pattern** **Color temperature conversion filter** **80C+CC10C+CC10B (OUTDOOR adjustment filter)** **C8, W10**	● **EXT TRIGGER TP-26 (ID), [Process Board]** **Pin ⑭ of hinged connector P**	**R80(OUT-STOPPER)** **R81 (IN-STOPPER)** **[AGC Board]**	● Check that the white balance switch is set to **"AUTO"**. 1. Install the **C8** filter and the OUTDOOR adjustment filter to the lens front. ● Set the **VIDEO OUT** LEVEL TO **100 IRE (700 mV)** by the iris control knob (lens side). (When it is less than **100 IRE**, open the iris.) 2. Measure the voltage at the **P hinge connecter pin ⑭** by the DC voltmeter to check that the voltage is less than **2.4 V**. If the voltage is **2.4 V** or more, adjust it to less than **2.4 V** by **R80 (OUT-STOPPER)**. 3. Detach the **C8** filter and the OUT-DOOR adjustment filter, and install the **W10** filter to the lens front. 4. Measure the voltage at the **P hinge connecter pin ⑭** to check that the voltage is **2.8 V** or more. If the voltage is less than **2.8 V**, adjust it to **2.8 V** or more **by R81 (IN-STOPPER)**.
26.	**WHITE BALANCE adjustment 4 (AUTO)**	**DC voltmeter** **Vectorscope** **Oscilloscope (H-rate 10:1)** **Color temperature conversion filter** **80C+CC10C+CC10B (OUTDOOR adjustment filter)** **Gray scale Pattern** 	● **EXT TRIGGER TP-26 (ID), [PROCESS Board]** **Pin ⑭ of hinged connector P** **VIDEO OUT**	**R20 (AUTO ADJ) [AGC Board]**	● Check that the white balance switch is set to **"AUTO"**. ● Set the **VIDEO OUT** LEVEL TO **100 IRE (700 mV)** by the iris control knob (lens side). (When it is less than **100 IRE**, open the iris.) **[When using the Vectorscope]** 1. Measure the voltage at the **P hinged connecter pin ⑭** and adjust **R20 (AUTO ADJ)** so that the voltage within **2.7±0.001 V** and the carrier on the vectorscope is rounded. 2. Pick up the gray scale and check that the auto white balance follows up under the inddor or outdoor illumination.  **Fig. 26-1** **[When using the Oscillscope]** 1. Measure the voltage at the **P hinged connector pin ⑭** and adjust **R20 (AUTO ADJ)** so that the voltage is **2.7 ± 0.001V**. 2. Pick up the gran schale and check that the auto white balance follows up under the inddor or outdoor illumination (by the Oscilloscope).

No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
27.	WHITE BALANCE adjustment 5 (STOPPER 2)	DC voltmeter Gray scale pattern Color temperature conversion filter 80C+CC10C+CC10B (OUTDOOR adjustment filter)	● EXT TRIGGER TP-26 (ID) [PROCESS Board] Pin ⑭ of hinged connector P	R80 (OUT-STOPPER) R81 (IN-STOPPER) [AGC Board]	● Check to make sure the white balance switch is set to "☀" (OUTDOOR). 1. Mount the OUTDOOR adjustment filter to the lens front. ● Set the VIDEO OUT level to 100 IRE (700 mV). 2. Measure the voltage at the P hinged connector pin ⑭, and set it to (Vo) at that time. ● Check that the white balance switch is set to "AUTO". 3. Install the C8 filter and the OUTDOOR adjustment filter to the lens front. ● Set the VIDEO OUT level to 100 IRE (700 mV). 4. Measure the voltage at the P hinged connector pin ⑭ and adjust R80 (OUT-STOPPER) so that the voltage is $V_0-0.03\pm0.005$ V. 5. Detach the C8 filter and the OUTDOOR adjustment filter, and install the W10 filter to the lens front. 6. Measure the voltage at the P hinged connector Pin ⑭ and adjust R81 (IN-STOPPER) so that the voltage is 2.74 ± 0.005 V.
28.	G CLIP adjustment	Oscilloscope [H-rate 10:1] Gray scale pattern	● EXT TRIGGER TP-26 (ID) [PROCESS Board] VIDEO OUT	R11 (WC) [ENCODER Board] R26 (G.PEAK) [PROCESS Board]	● Open the iris sufficiently. 1. While observing the waveform at VIDEO OUT, adjust R11 (WC) so that the waveform is around 110 IRE (770±5 mVp-p) as shown in Fig. 28-1. 2. Adjust R26 (G. PEAK) so that the carrier in the upper portion of the waveform is minimized as shown in Fig. 28-1.



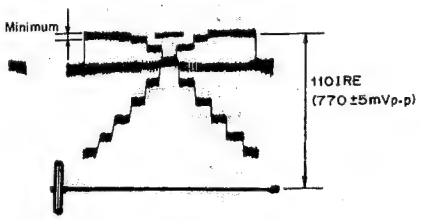
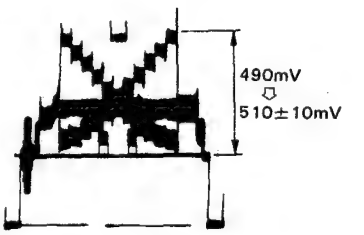
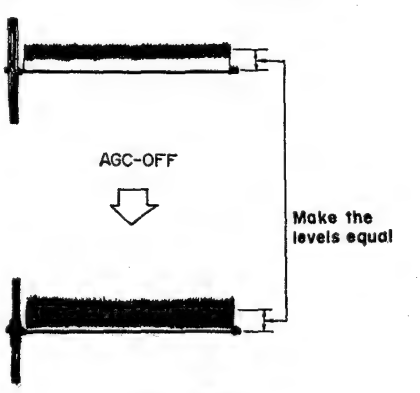
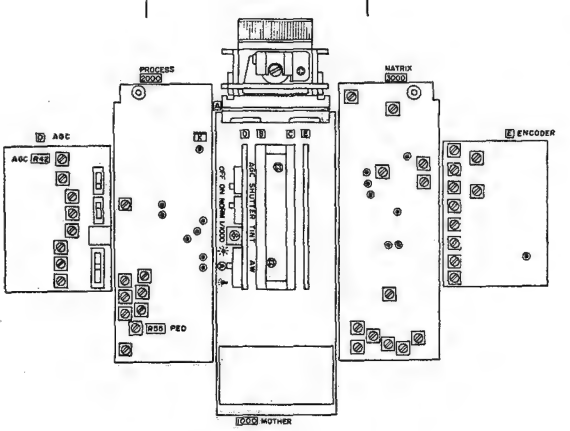
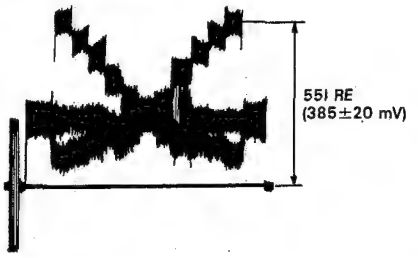
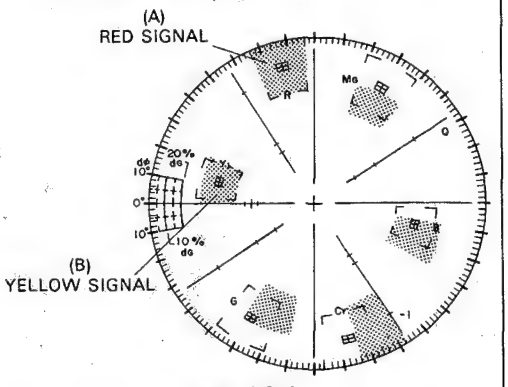
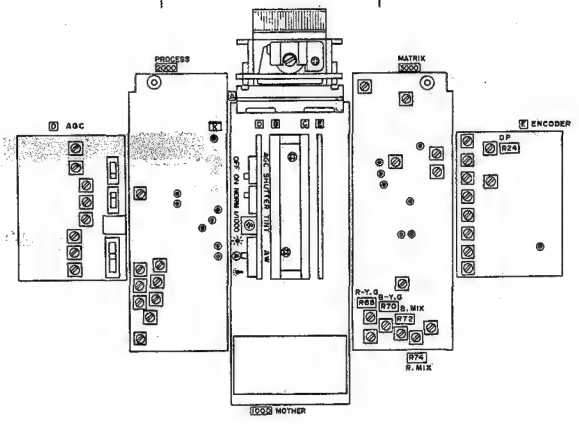


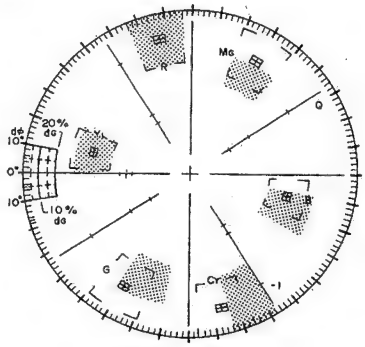
Fig. 28-1

No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
29.	AGC START POINT adjustment	Oscilloscope [H-rate 10:1] Gray scale Pattern	VIDEO OUT	R42 (AGC) [AGC Board]	● Set the **VIDEO OUT** level to **70 IRE (490 mV)** by the iris control knob (lens side). ● Set the white balance switch to "☀" **(INDOOR)**. 1. Set the AGC switch to **ON**. 2. At this time, adjust **R42 (AGC)** so that the waveform is **510±10 mV** as shown in **Fig. 29-1**.  **Fig. 29-1** **NOTE:** The operation speed is low. So, pay sufficient attention. 3. After adjustment, set the AGC switch to **"OFF"**.
30.	Y. SETUP 2 adjustment	Oscilloscope [H-rate 10:1]	VIDEO OUT	R55 (PED) [PROCESS Board]	● Close the iris with the lens cap. 1. Adjust **R55 (PED)** so that the setup level does not vary due to the repeated **ON/OFF** operation of the AGC switch as shown in **Fig. 30-1**. 2. After adjustment, check the Y. setup level. If deviated, repeatedly perform **"16. Y. SETUP 1 adjustment"** and this **Y. SETUP 2 adjustment.**  **Fig. 30-1**



No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
31.	AGC DEPEN-DENT adjustment	Oscilloscope [H-rate 10:1] Gray scale Pattern	VIDEO OUT	R24 (DP) [ENCODER Board]	● Set the AGC switch to **ON**. ● Set the illumination of the object to **10 lux.** ● Open the iris sufficiently. 1. Adjust **R24 (DP)** so that the waveform level is **55 IRE (385±20mV)** as shown in **Fig. 31-1**.  **Fig. 31-1**
32.	COLOR REPRO-DUCTION adjustment	Vectorscope Color bar pattern (CC-2T) Oscilloscope [H-rate 10:1] Monitor TV	VIDEO OUT	R72 (B.MIX) R74 (R. MIX) R68 (R-Y. G) R70 (B-Y. G) [MATRIX Board]	1. Take the color bar pattern and set the white level to **700 mV** by the iris contro knob. 2. Adjust **R72 (B. MIX)**, **R74 (R. MIX)**, **R68 (R-Y G)** and **R70 (B-Y G)** so that the red signal enters within frame (A) and the yellow signal enters within frame (B) as shown in **Fig. 32-1**.  **Fig. 32-1** 3. Set the AGC Switch to **OFF.** **NOTE:** When no vectorscope is available, take the color bar pattern and optimize the color reproduction while seeing the monitor TV.



No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
33.	BACK FOCUS adjustment	Monitor TV Siemens chart or resolution pattern. Siemens pattern or white/black stripe object	VIDEO OUT	Lock screw Focus screw	● This adjustment is also feasible without removing the cover. ● **Open the iris in the darkisk location.** 1. Place the siemens chart in a place more than 3 m away. (Place the siemens chart in a place as much away as possible.) 2. Focus the lens to the chart in the TELE end. Next, engaging the WIDE mode slowly, check that the lens is just focused. 3. If out of focus, loosen the lock screw and then adjust the focus screw to just focus. 4. Repeatedly perform **steps 2** and **3** until it is optimumly focused. 5. Where an optimun back focus is obtained, tighten the lock screw.
34.	FINAL CHECK	Oscilloscope (H-rate 10:1) Vectorscope Gray scale pattern Color bar pattern (CC-2T) Colored object, etc.	VIDEO OUT  Fig. 34-1		1. In the standard iris mode or auto iris mode (with the lens having an auto iris function), shoot the color bar pattern, and check that the carriers for individual colors on the vectorscope are located as shown in **Fig. 34-1**. 2. Operate switches to check their respective proper operations. 3. Shoot the gray scale pattern and check GAMMA, WHITE BALANCE, CARRIER BALANCE, Y. SETUP, etc. at VIDEO OUT. 4. Shoot an appropriate color object and check the color reproduction, the camera function, etc. 5. If the results of check are not satisfactory, perform the respecitive adjustment items again.

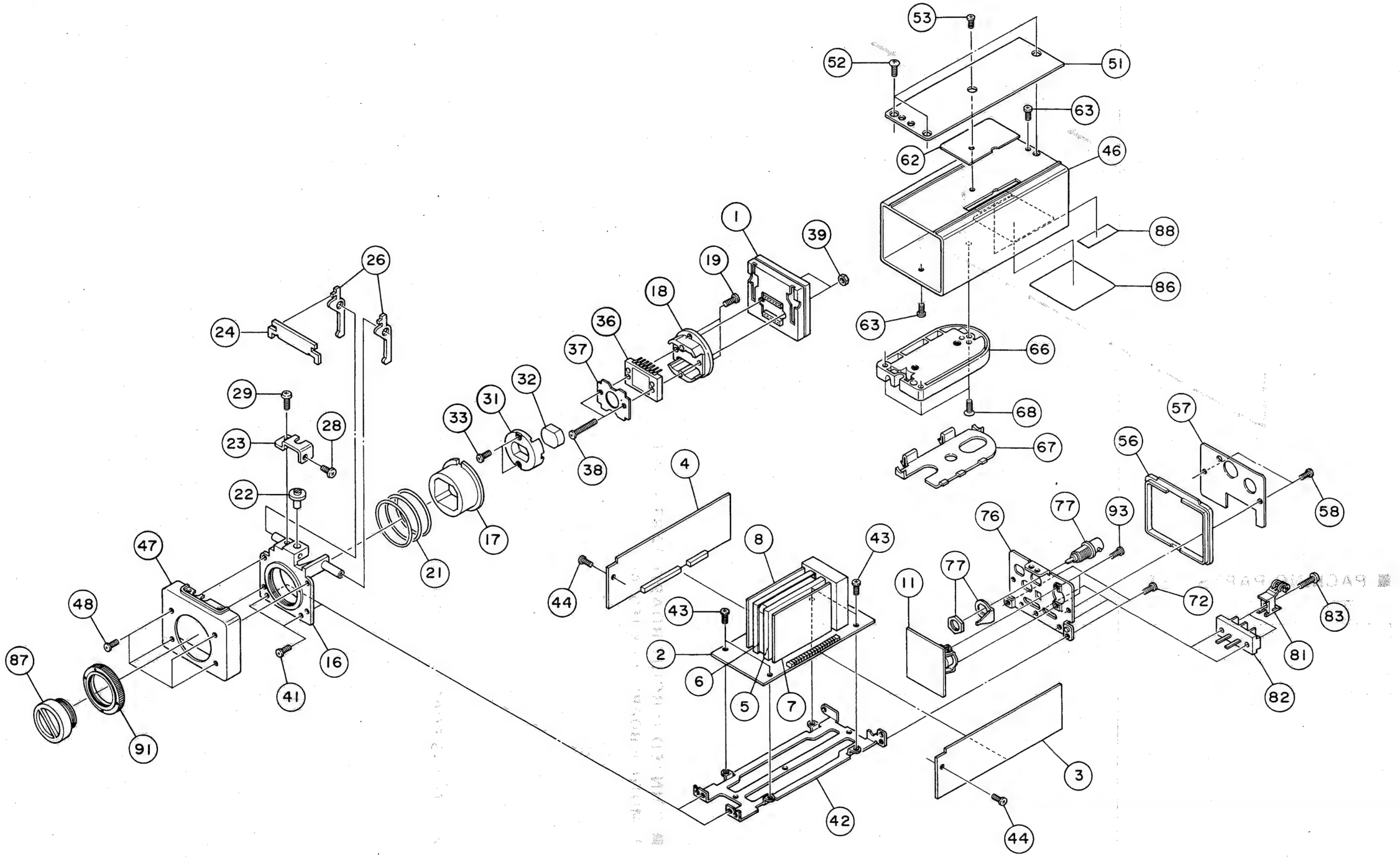
3. PARTS LIST

■ SYSTEM ASSEMBLY REPLACEMENT PARTS LIST

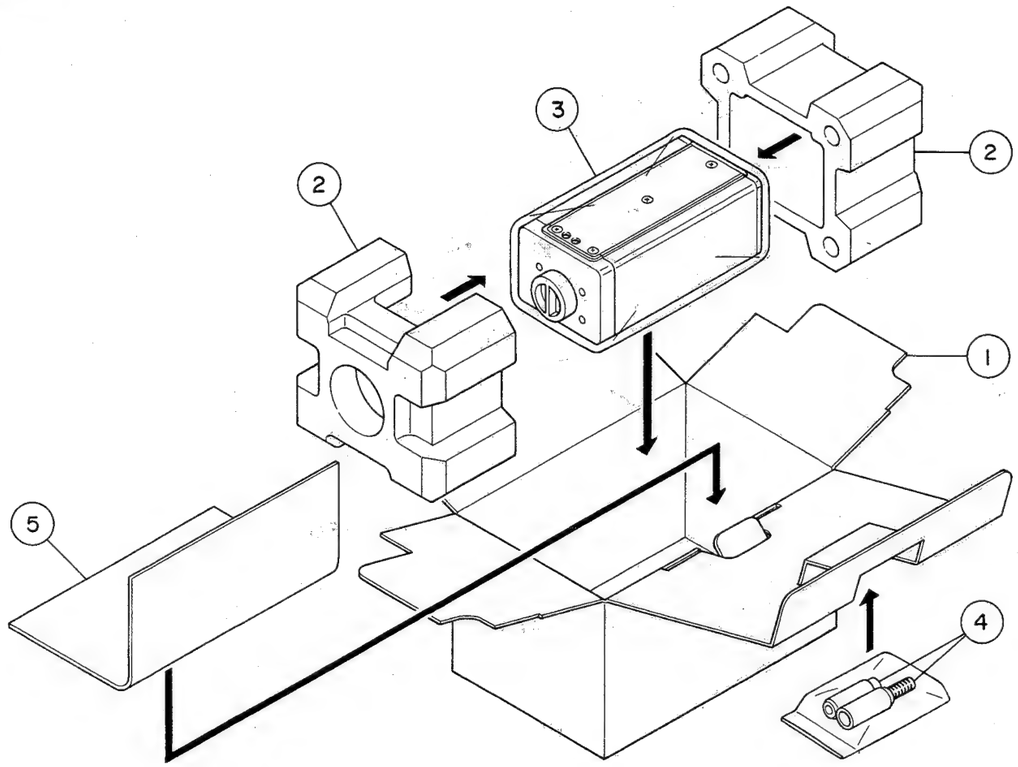
The module PC boards marked with ◎ are supplied as assemblies.

	SYMBOL NO.	PART NO.	PART NAME	REMARKS
⚠	1	CAX-A001A	IMAGER MODULE	◎
⚠	2	————	MOTHER BOARD	CAX-1502A
⚠	3	————	PROCESS BORAD	CAX-2501A
⚠	4	————	MATRIX BOARD	CAX-3501A
⚠	5	CAX-B501A	TG &V. DRV. MODULE	◎
⚠	6	CAX-C501A	SSG MODULE	◎
⚠	7	CAX-D001A	AGC & W/B MODULE	◎
⚠	8	CAX-E501A	ENCODER MODULE	◎
⚠	11	————	TERMINAL BOARD	CAX-9503A
	16	CM21346-A01	CHASSIS MOUNT	
	17	CM32653-A01	ADJUST RING	
	18	CM32654-001	IMAGER HOLDER	
	19	SPSK2040M	MINI SCREW	×2
	21	CM44649-001	ADJUST SPRING	
	22	CM44650-001	ECCENTRIC ROD	
	23	CM44651-002	LOCK PLATE	
	24	CM44652-001	PUSH BAR	
	26	CM44653-001	ROCKING ARM	×2
	28	SPSP26042	SCREW	
	29	SPSX26082	PM SCREW	
	31	CM32655-A01	LPF HOLDER	
	32	CE41373-A0A	OP-LPF ASSY	
	33	SPSK2040M	MINI SCREW	×2
	36	ICX031AK	CCD IMAGER	
	37	CM44654-001	IMAGER MASK	
	38	CM44002-001	MINI SCREW	×2
	39	NNS2000Z	NUT	×2
	41	SPSK2040M	MINI SCREW	×2
	42	CM21353-001	CHASSIS FRAME	
	43	SPSH2040M	MINI SCREW	×4
	44	SPSH2040M	MINI SCREW	×2
	46	CM21375-B0D	AL CASE ASSY	
	47	CM21349-001	FRONT DIECASTING	
	48	SPSK2050M	MINI SCREW	×4
	51	CM32672-005	TOP PLATE	
	52	SHSP2606R	SCREW	×3
	53	SDSP2603R	SCREW	
	56	CM32664-A01	REAR MOLD FRAME	
	57	CM32665-009	TERMINAL PALTE	
	58	SPSK2040M	MINI SCREW	×2
	62	CM44873-005	SW ADJ LABEL	
	63	SPSK2040R	MINI SCREW	×2
	66	CM21394-B0A-M0	TRIPOD BASE ASSY	
	67	CM32754-B01-M0	TRIPOD COVER	
	68	SHSP2606R	SCREW	×3
	72	SPSH2040M	MINI SCREW	×2
	76	CM21348-A01	TERMINAL BKT	
	77	CEMB004-00A	BNC CONNECTOR	
	81	CM32763-A01	CABLE CLIP	×2
	82	CE41382-001	TERMINAL	
	83	SPSP3010M	SCREW	×2
	86	CM32667-019 (R)	R N LABEL	
	87	CM40016-001	DUST COVER	
	88	CM44485-A01-LA	LABEL	
	91	CM44748-001	C MOUNT ADAPTOR	
	93	SPSK2040M	MINI SCREW	×2

■ EXPLODED VIEW



■ PACKING



■ PACKING PARTS LIST

SYMBOL NO.	PART NO.	PART NAME	REMARKS
1	CP20228-053	PACKING CASE	
2	CP20369-00A	CUSHION ASSY	
3	CP30367-001	POLY BAG	
4	CE41155-001	IRIS PLUG	
5	TK-885E-IB-A	INST. BOOK	

■ PRINTED CIRCUIT BOARD PARTS LIST

1. MOTHER BOARD (CAX-1502A)

SYMBOL NO.	PART NO.	PART NAME	REMARKS
DIODE			
D1001	MA3056(L)-W	CHIP ZENER DIODE	
D1002	MA157-W	CHIP DIODE	
D1003	MA157-W	CHIP DIODE	
OTHERS			
	CE41145D-B0A	SW REGULATOR	
	CM32855-001	SHIELD L	
	CM32860-A01	SHIELD FRAME	
	CM32661-001	SHIELD R	
	CM44807-001	MODULE INSULATOR ×2	
⚠	CM44800-B01	INSULATOR A	
⚠ CP1001	ICP-N5	IC PROTECTOR	

2. PROCESS BOARD (CAX-2501A)

SYMBOL NO.	PART NO.	PART NAME	REMARKS
VARIABLE R			
R2026	CEVP004-472WA	CH V R	4.7kΩ G.PEAK
R2055	CEVP004-223WA	CH V R	22kΩ PED
R2057	CEVP004-103WA	CH V R	10kΩ G.CTRL
R2058	CEVP004-103WA	CH V R	10kΩ KNEE
R2059	CEVP004-103WA	CH V R	10kΩ GAM.1
R2061	CEVP004-103WA	CH V R	10kΩ R.GAIN
R2062	CEVP004-103WA	CH V R	10kΩ B.GAIN
R2063	CEVP004-103WA	CH V R	10kΩ MAX.GAIN
R2074	CEVP004-103WA	CH V R	10kΩ GAM 2
CAPACITOR			
C2001	QCT81CH-180YLS	CH C CAP.	18pF 50V J
C2002	NEE11AM-336RZ	CH TAN E CAP.	33μF 10V M
C2003	QCT81CH-180YLS	CH C CAP.	18pF 50V J
C2004	NEE11CM-106RZ	CH TAN E CAP.	10μF 16V M
C2005	QCT81CH-220YLS	CH C CAP.	22pF 50V J
C2006	NEE11CM-106RZ	CH TAN E CAP.	10μF 16V M
C2007	NEE11AM-335RY	CH TAN E CAP.	3.3μF 10V M
C2008	NEE20GM-335RY	CH TAN E CAP.	3.3μF 4V M
C2009	QCT81CH-880YLS	CH C CAP.	88pF 50V J
C2011	NEE11AM-336RZ	CH TAN E CAP.	33μF 10V M
C2012	NEA11CM-106RZ	CH AL E CAP.	10μF 16V M
C2013	NEE11AM-336RZ	CH TAN E CAP.	33μF 10V M
C2014	QCT81CH-680YLS	CH C CAP.	68pF 50V J
C2015	NEA11CM-106RZ	CH AL E CAP.	10μF 16V M
C2016	QCT81CH-101YLS	CH C CAP.	100pF 50V J
C2017	NEE20GM-335RY	CH TAN E CAP.	3.3μF 4V M
C2018	QCY81EK-104YL	CH C CAP.	0.1μF 25V K
C2019	QCY81EK-104YL	CH C CAP.	0.1μF 25V K
C2020	QCT81HZ-473YLS	CH C CAP.	0.047μF 50V Z
C2021	QCY81EK-104YL	CH C CAP.	0.1μF 25V K
C2022	QCY81EK-104YL	CH C CAP.	0.1μF 25V K
C2023	QCY81EK-104YL	CH C CAP.	0.1μF 25V K
C2024	QCY81EK-104YL	CH C CAP.	0.1μF 25V K
C2025	NEA11CM-106RZ	CH AL E CAP.	10μF 16V M
C2026	QCF81HZ-473YLS	CH C CAP.	0.047μF 50V Z
C2027	QEU41AM-227M	E CAP.	220μF 10V M
C2028	QCF81HZ-473YLS	CH C CAP.	0.047μF 50V Z
C2032	QCF81HZ-473YLS	CH C CAP.	0.047μF 50V Z
C2034	QCF81HZ-473YLS	CH C CAP.	0.047μF 50V Z
C2035	NEA11CM-106RZ	CH AL E CAP.	10μF 16V M
C2036	NEE21CM-105RY	CH TAN E CAP	1μF 16V M

CAUTION

- The parts marked ⚠ are very important for the safety. When replacing these parts, be sure to use specified ones to secure the safety and performance.
- The parts which do not have the drawing in this Parts List, P.C. Board Ass'y and the Part No. columns of which are filled with lines —— , will not be supplied.
- As a rule, the resistors and capacitors which are indicated as shown in (NOTE 2) "HOW TO EXPRESS PARTS NUMBERS OF STANDARD PARTS" are not shown in the list of the parts on the board.
  When ordering the service parts, confirm the resistance/rated power, capacitance/rated voltage, and type of the parts, then order by the part No. indicated according to (NOTE 2).

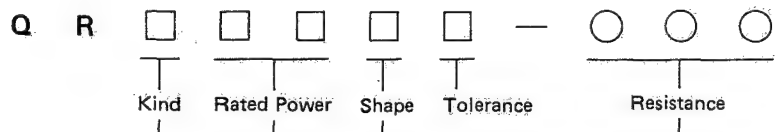
(NOTE 1) ABBREVIATIONS OF RESISTORS, CAPACITORS AND TOLERANCES

RESISTORS		CAPACITORS	
C R	Carbon Resistor	C CAP.	Ceramic Capacitor
F R	Fusible Resistor	E CAP.	Electrolytic Capacitor
P R	Plate Resistor	M CAP.	Mylar Capacitor
V R	Variable Resistor	HV CAP.	High Voltage Capacitor
HV R	High Voltage Resistor	MF CAP.	Metalized Film Capacitor
MF R	Metal Film Resistor	MM CAP.	Metalized Mylar Capacitor
MG R	Metal Glazed Resistor	MP CAP.	Metalized Polystyrol Capacitor
MP R	Metal Plate Resistor	PP CAP.	Polypropylene Capacitor
OM R	Metal Oxide Film Resistor	PS CAP.	Polystyrol Capacitor
CMF R	Coating Metal Film Resistor	TF CAP.	Thin Film Capacitor
UNF R	Non-Flammable Resistor	MPP CAP.	Metalized Polypropylene Capacitor
CH V R	Chip Variable Resistor	TAN. CAP.	Tantalum Capacitor
CH MG R	Chip Metal Glazed Resistor	CH C CAP.	Chip Ceramic Capacitor
COMP. R	Composition Resistor	BP E CAP.	Bi-Polar Electrolytic Capacitor
LPTC R	Linear Positive Temperature Coefficient Resistor	CH AL E CAP.	Chip Aluminum Electrolytic Capacitor
		CH AL BP CAP.	Chip Aluminum Bi-Polar Capacitor
		CH TAN. E CAP.	Chip Tantalum Electrolytic Capacitor
		CH AL BP E CAP.	Chip Aluminum Bi-Polar Electrolytic Capacitor

TOLERANCES									
F	G	J	K	M	N	R	H	Z	P
± 1 %	± 2 %	± 5 %	± 10 %	± 20 %	± 30 %	+ 30 % − 10 %	+ 50 % − 10 %	+ 80 % − 20 %	+ 100 % − 0 %

(NOTE 2) HOW TO EXPRESS PARTS NUMBERS OF STANDARD PARTS

■ RESISTOR



Symbol	Part Name
C	COMP. R
D	C R
S	CH MG R

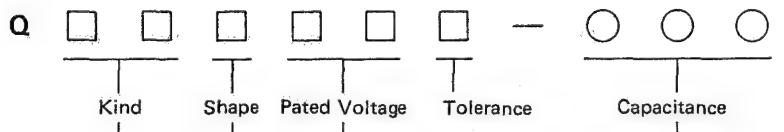
Symbol	Rated Power
0 1	1 W
1 2	1/2 W
1 4	1/4 W
1 6	1/6 W
1 8	1/8 W

Symbol	Shape
1	Straight lead
8	Chip

Indicate with first two-figure expressed by Ω and following 0.
Please note that, in case of resistance less than 10 Ω, a letter "R" will be effective as point.

Ex. · 2.2 Ω → 2R2
· 470 Ω = 47×10^1 → 471
· 150 kΩ = 15×10^4 → 154

■ CAPACITOR



Symbol	Part Name
C S	C CAP.
C S	CH C CAP.
E T	E CAP.
F M	M CAP.

6 Figure \ 5 Figure	0	1	2
A		10 V	100 V
C		16 V	160 V
D			200 V
E		25 V	250 V
H		50 V	500 V
J	6.3 V	63 V	
V		35 V	

Indicate with first two-figure expressed by pF and following 0.
Please note that, in case of capacitance less than 10 pF, a letter "R" will be effective as point.

Ex. · 5 pF = → 5R0
· 1000 pF = 10×10^2 → 102
· 47 μF = 47×10^6 → 476

Symbol	Shape
1	Straight lead
1	Leads in the same direction
8	Chip
A	Leads in the same direction (Compact part)

3. MATRIX BOARD (CAX-3501A)

SYMBOL NO.	PART NO.	PART NAME	REMARKS
VARIABLE R			
R3009	CEVP004-102WA	CH V R	1kΩ R/B0 GAIN
R3013	CEVP004-103WA	CH V R	10kΩ R/B BIAS
R3025	CEVP004-102WA	CH V R	1kΩ R/B1 GAIN
R3028	CEVP004-103WA	CH V R	10kΩ G. BIAS
R3040	CEVP004-102WA	CH V R	1kΩ G. GAIN
R3061	CEVP004-103WA	CH V R	10kΩ R/B OFF SET. 2
R3065	CEVP004-472WA	CH V R	4.7kΩ R/B OFF SET. 1
R3068	CEVP004-103WA	CH V R	22kΩ R-Y. G
R3070	CEVP004-223WA	CH V R	22kΩ B-Y. G
R3072	CEVP004-223WA	CH V R	22kΩ B MIX
R3074	CEVP004-223WA	CH V R	22kΩ R MIX
R3078	CEVP004-103WA	CH V R	10kΩ AP. G
CAPACITOR			
C3001	NEE11AM-475RZ	CH TAN E CAP.	4.7μF 10V M
C3002	QCF81HZ-473YL	CH C CAP.	0.047μF 50V Z
C3003	NEE20GM-106RY	CH TAN E CAP.	10μF 4V M
C3004	NEE20GM-106RY	CH TAN E CAP.	10μF 4V M
C3006	QCF81HZ-473YL	CH C CAP.	0.047μF 50V Z
C3007	NEE11CM-106RZ	CH TAN E CAP.	10μF 16V M
C3008	QCF81HZ-473YL	CH C CAP.	0.047μF 50V Z
C3009	NEN10JM-106RZ	CH AL BP E CAP.	10μF 6.3V M
C3010	QCF81HZ-473YLS	CH C CAP.	0.047μF 50V Z
C3011	QCF81HZ-473YLS	CH C CAP.	0.047μF 50V Z
C3012	QCF81HZ-473YLS	CH C CAP.	0.047μF 50V Z
C3014	QCT81CH-101YLS	CH C CAP.	100pF 50V J
C3017	NEE20GM-106RY	CH TAN. E CAP.	10μF 4V M
C3018	NEE20GM-106RY	CH TAN E CAP.	10μF 4V M
C3019	NEN10JM-106RZ	CH AL BP E CAP.	10μF 6.3V M
C3020	QCF81HZ-473YLS	CH C CAP.	0.047μF 50V Z
C3021	QCF81HZ-473YLS	CH C CAP.	0.047μF 50V Z
C3022	QCF81HZ-473YLS	CH C CAP.	0.047μF 50V Z
C3024	QCT81CH-101YLS	CH C CAP.	100pF 50V J
C3027	NEE20GM-106RY	CH TAN. E CAP.	10μF 4V M
C3028	NEE20GM-106RY	CH TAN E CAP.	10μF 4V M
C3029	NEE10JM-685RZ	CH TAN. E CAP.	6.8μF 6.3V M
C3030	NEE11AM-475RZ	CH TAN. E CAP.	4.7μF 10V M
C3031	QCF81HZ-473YL	CH C CAP.	0.047μF 50V Z
C3032	QCT81CH-680YLS	CH C CAP.	68pF 50V J
C3033	QCY81EK-104YL	CH C CAP.	0.1μF 25V K
C3034	QCT81CH-680YLS	CH C CAP.	68pF 50V J
C3035	QCT81CH-560YLS	CH C CAP.	56pF 50V J
C3036	QCY81EK-104YL	CH C CAP.	0.1μF 25V K
C3037	QCY81EK-104YL	CH C CAP.	0.1μF 25V K
C3038	QCY81EK-104YL	CH C CAP.	0.1μF 25V K
C3039	NEE11AM-475RZ	CH TAN. E CAP.	4.7μF 10V M
C3040	QCF81HZ-473YL	CH C CAP.	0.047μF 50V Z
C3041	QCY81EK-104YL	CH C CAP.	0.1μF 25V K
C3042	QCY81EK-104YL	CH C CAP.	0.1μF 25V K
C3043	QCF81HZ-473YLS	CH C CAP.	0.047μF 50V Z
C3044	QCF81HZ-473YLS	CH C CAP.	0.047μF 50V Z
C3045	QCT81CH-390YLS	CH C CAP.	39pF 50V J
C3046	QCT81CH-470YLS	CH C CAP.	47pF 50V J
C3047	QEE41CK-225M	TAN. CAP.	2.2μF 16V K
TRANSFORMER			
T3001	CE41120-00AY	REFLOW TRANSF.	
T3002	CE41120-00AY	REFLOW TRANSF.	
T3003	CE41089-00AY	REFLOW TRANSF.	

SYMBOL NO.	PART NO.	PART NAME	REMARKS
DIODE			
D3001	MA151WA-W	CHIP DIODE	
D3002	MA151WA-W	CHIP DIODE	
D3003	MA151WA-W	CHIP DIODE	
D3004	MA151A-W	CHIP DIODE	
TRANSISTOR			
Q3001	2SB709 (Q, R) -W	CHIP TRANSISTOR	
Q3002	2SB709 (Q, R) -W	CHIP TRANSISTOR	
Q3003	2SB709 (Q, R) -W	CHIP TRANSISTOR	
Q3004	2SB709 (Q, R) -W	CHIP TRANSISTOR	
Q3005	2SC2778 (B, C) -W	CHIP TRANSISTOR	
Q3006	2SB709 (Q, R) -W	CHIP TRANSISTOR	
Q3007	2SB709 (Q, R) -W	CHIP TRANSISTOR	
Q3008	2SC2778 (B, C) -W	SI. TRANSISTOR	
Q3009	2SC2778 (B, C) -W	SI. TRANSISTOR	
Q3010	2SB709 (Q, R) -W	CHIP TRANSISTOR	
Q3011	2SB709 (Q, R) -W	CHIP TRANSISTOR	
Q3012	2SC2778 (B, C) -W	CHIP TRANSISTOR	
Q3013	2SC2778 (B, C) -W	CHIP TRANSISTOR	
Q3014	2SC2778 (B, C) -W	CHIP TRANSISTOR	
Q3015	2SB709 (Q, R) -W	CHIP TRANSISTOR	
Q3016	2SB709 (Q, R) -W	CHIP TRANSISTOR	
Q3017	2SC2778 (B, C) -W	CHIP TRANSISTOR	
Q3018	2SC2778 (B, C) -W	CHIP TRANSISTOR	
IC			
IC3001	IR3P489	I. C.	
IC3002	MN8029S-W	I. C. (M)	
IC3003	MN8029S-W	I. C. (M)	

4. TERMINAL BOARD (CAX-9503A)

SYMBOL NO.	PART NO.	PART NAME	REMARKS
CAPACITOR			
C9001	QEKA0JM-227M	E CAP.	220μF 6.3V M
C9006	QEKA0JM-227M	E CAP.	220μF 6.3V M
DIODE			
D9001	GL-3PR2	L. E. D.	
D9002	W06A	SI. DIODE	
OTHERS			
	CM44225-B07	FUSE LABEL	
	CEX40512-00D	MINI CONNECTOR	
	CEMG001-001	FUSE CLIP	×2
	C41045-9	LED SPACER	
	CM44659-001	SOCKET HOLDER	
⚠ F9001	QMF51E2-1R0S	FUSE	1A

■ MODULE PRINTED CIRCUIT BOARD PARTS LIST

The following module PC boards are supplied as assemblies.
The component parts only the module PC boards are available only when the parts are listed in the "MODULE PRINTED CIRCUIT BOARD PARTS LIST".

1. IMAGER MODULE BOARD (CAX-A001A)

SYMBOL NO.	PART NO.	PART NAME	REMARKS
VARIABLE R			
RA011	CEVP003-103WA	CH V R	10kΩ O. F. D.
OTHERS			
	CE41372-001	CCD SOCKET	

2. TG & V-DRV MODULE BOARD (CAX-B501A)

SYMBOL NO.	PART NO.	PART NAME	REMARKS
CAPACITOR			
CB037	QAT3661-300M	TRIM CAP.	

3. SSG MODULE BOARD (CAX-C501A)

SYMBOL NO.	PART NO.	PART NAME	REMARKS
CAPACITOR			
CC001	QAT3661-300M	TRIM CAP.	30pF
CC002	NAT3111-200MZ	TRIM CAP.	20pF

4. AGC & W/B MODULE BOARD (CAX-D001A)

SYMBOL NO.	PART NO.	PART NAME	REMARKS
VARIABLE R			
RD020	CEVP004-223WA	CH V R	22kΩ AUTO ADJ.
RD025	CEVP004-472WA	CH V R	47kΩ IN-PRE
RD026	CEVP004-472WA	CH V R	4.7kΩ OUT PRESET
RD029	QVPB611-102K	V R	1kΩ TINT
RD032	CEVP004-222WA	CH V R	2.2kΩ R. OFF SET
RD035	CEVP004-223WA	CH V R	22kΩ R. GAIN
RD042	CEVP004-472WA	CH V R	4.7kΩ A. G. C.
RD080	CEVP004-102WA	CH V R	1kΩ OUT-STOPPER
RD081	CEVP004-102WA	CH V R	1kΩ IN-STOPPER
OTHERS			
SWD001	QSS4B23-C03	SLIDE SWITCH	AW
SWD002	QSS1A12-C05	SLIDE SWITCH	AGC
SWD003	QSS1A12-C05	SLIDE SWITCH	SHUTTER

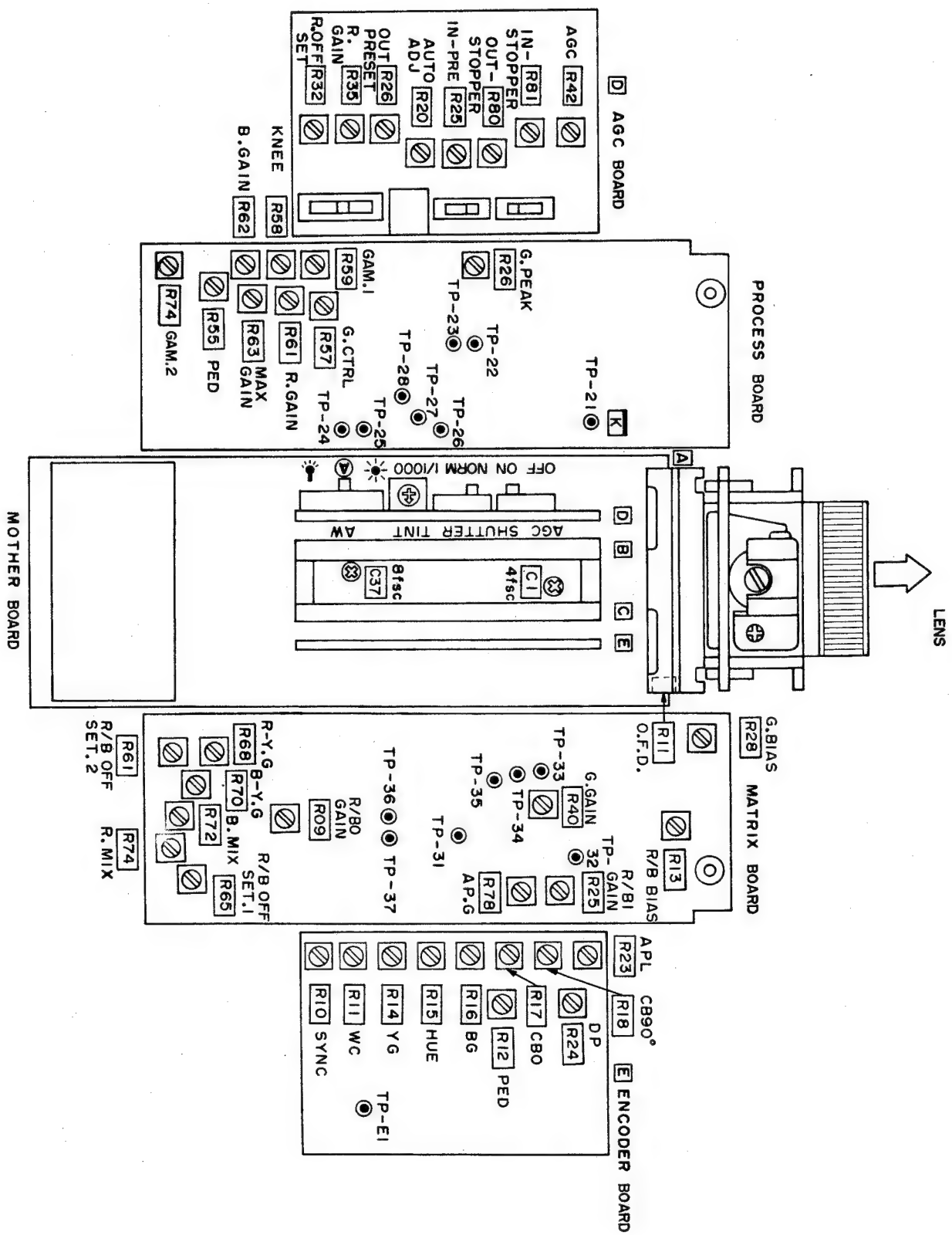
5. ENCODER MODULE BOARD (CAX-E501A)

SYMBOL NO.	PART NO.	PART NAME	REMARKS
VARIABLE R			
RE010	CEVP003-103WA	CH V R	10kΩ SYNC
RE011	CEVP003-103WA	CH V R	10kΩ WC
RE012	CEVP003-103WA	CH V R	10kΩ PED
RE014	CEVP003-103WA	CH V R	10kΩ YG
RE015	CEVP003-103WA	CH V R	10kΩ HUE
RE016	CEVP003-103WA	CH V R	10kΩ BG
RE017	CEVP003-103WA	CH V R	10kΩ CB0
RE018	CEVP003-103WA	CH V R	10kΩ CB90
RE023	CEVP003-473WA	CH V R	47kΩ APL
RE024	CEVP003-473WA	CH V R	47kΩ DP

[APPENDIX]

■ ADJUSTMENT VR LOCATION

- Please refer to this APPENDIX usefully when the adjustment, etc.



Chassis V54

TK-885E

STANDARD CIRCUIT DIAGRAM

CONTENTS

No. 50106
Aug. 1988

1. NOTES ON USING CIRCUIT DIAGRAMS

1. Since the circuit diagram is a standard one, the circuit and circuit constants may be subject to change for improvement without any notice.

2. Replacing the shaded (▩) parts in the circuit diagram, be sure to use parts specified for safety purposes.

3. The voltage values and waveforms have been measured under the following conditions:
   - ● Illumination : Illumination condition during standard adjustment
   - ● Object : JVC Gray scale pattern (γ = 2.2, 11 steps)
   - ● Iris : Set the VIDEO OUT waveform level to 700 mV_{P-P} (AGC OFF) with IRIS switch (at the lens side)
   - ● White balance : Standard setting position (indoor)
   - ● Voltage values : ALL DC voltage values. Measured by a high-precision tester or a digital voltmeter. *Note: Values inside (*) are measured during genlock (with the black burst signal).
   - ● Waveform : Oscilloscope sweep time H: 20 μS/div. V: 5 mS/div. Others: Measured time is shown Usually a probe of 10:1 is used. (Indicated when a 1:1 probe is used.)

   *Note: See also the information given in the circuit diagram.

4. When entering the symbol numbers of parts on the Service Delivery Invoice, write as follows:
   [Example]
   In the PC board: CAX-1001A (R125 → R1125. C512 → C1512)

5. Indications on the circuit diagram.
   - ● Resistors
     10K: resistance value
     non-unit: [Ω]
     K: [KΩ]
     M: [MΩ]
     1/2W: rated allowable power [W]
     non-indication: 1/4 chip resistor or carbonresistor
   - ● Electrloytic Capacitors
     47/16: capacitance value [μF]/working voltage [V]
     NP/BP: non-polar/bipolar electrolytic capacitor Ⓣ or TAN.: Tantalum capacitor
   - ● Capacitors
     0.033: capacitance value
     1 or higher: [pF], less than 1 : [μF]
     100V: working voltage
     All DC voltage except for AC indicated.
     non-indication: 50V DC
     MY: Mylar capacitor
     PP: Polypropylene capacitor
     non-indication: Ceramic capacitor
   - ● Coils
     39: inductance value
     non-unit: [μH]
   - ● Connections
     □□: connector
     △ or ➔ : chip connector
     ○: soldering
   - * Refer to the parts list in the Service manual about the detailed indications of parts.

6. The non-indicated chip transistor and chip diode on the Circuit Diagrams are as follows.
   - ● PNP type : 2SB709 (Q, R)
   - ● NPN type : 2SC2778 (C, D)
   - ● Diode : MA151WA

Interchangeable parts	Supplied parts
2SB709, 709 (P-R), 709 (Q-R)	2SB709 (Q, R)
2SC2778, 2778 (B, C) 2778 (C, D)	2SC2778 (C, D)
2SD601, 601 (Q, R)	2SD601 (Q, R)
2SD601A, 601A (Q, R)	2SD601 (Q, R)

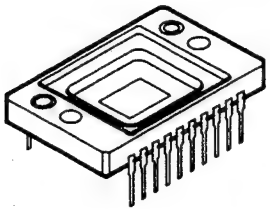
7. It is possible that the wiring diagram is inconsistent with the actual connection because of certain design improvements, etc. The diagram, therefore, should be used only for reference.

8. Color of P.C. Board. pattern.

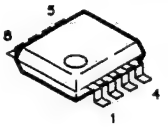
   Blue — Blue color shows top side pattern of P.C. Board.

   ▩ — Gray color shows bottom side pattern of P.C. Board.

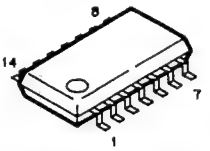
2. PIN ARRANGEMENTS OF IC's TRANSISTORS AND DIODES



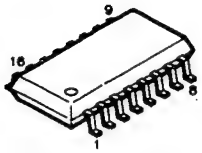
ICX031AX (20pin)



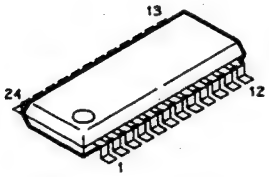
CXB0026AM (8pin)
MNH0026M (8pin)
MN8029S (8pin)
μPC358G (8pin)



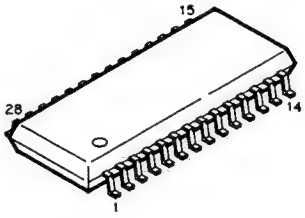
μPC4741G (14pin)
μPD74HC74G (14pin)



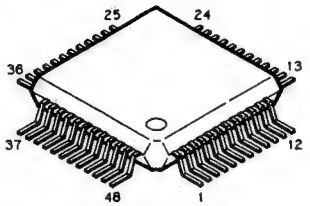
CAX1157M (16pin)



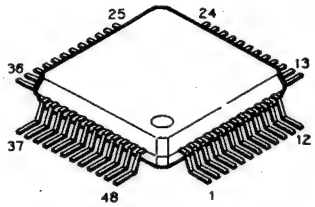
CX20180 (24pin)



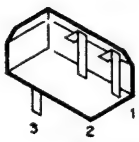
CX-7930A (28pin)



CX20053 (48pin)
CX20055 (48pin)
IR3P48 (48pin)



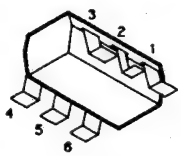
CXD1157Q

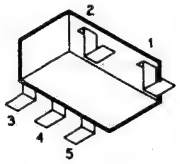


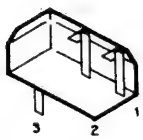
(C) (B) (E)
(G) (S) (D)

CHIP TRANSISTOR
2SA1022 (B, C)
2SA1022 (C)
2SB709 (P-R)
2SC2295 (C)
2SC2404 (D)
2SC2778 (B, C)
2SD601 (Q, R)

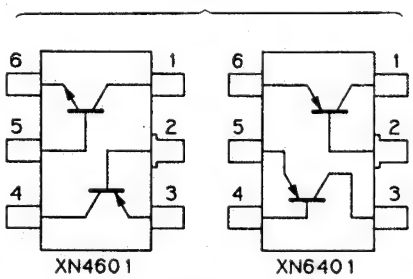
CHIP FET
2SK94
2SJ84 (Q, R)



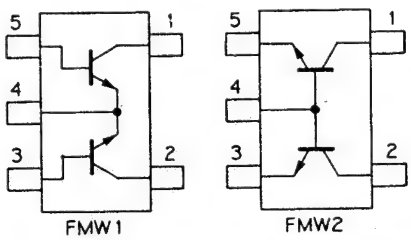




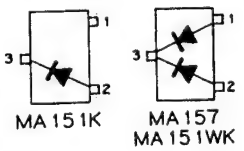
CHIP DIODE



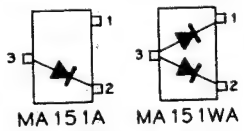
XN4601 XN6401



FMW1 FMW2

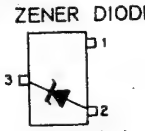


MA151K MA157
MA151WK



MA151A MA151WA

CHIP ZENER DIODE

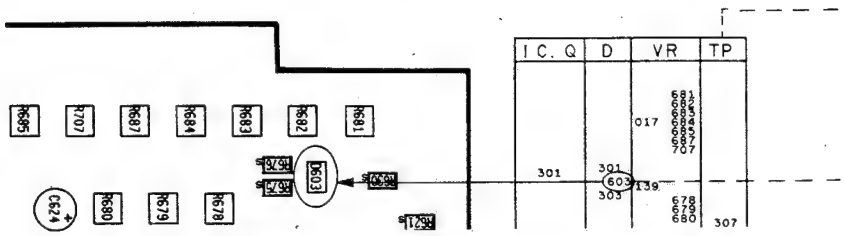


MA3091(M)

DIODE
W06A

VARIABLE CAPACITOR DIODE
1SV68

PC board parts quick reference diagram

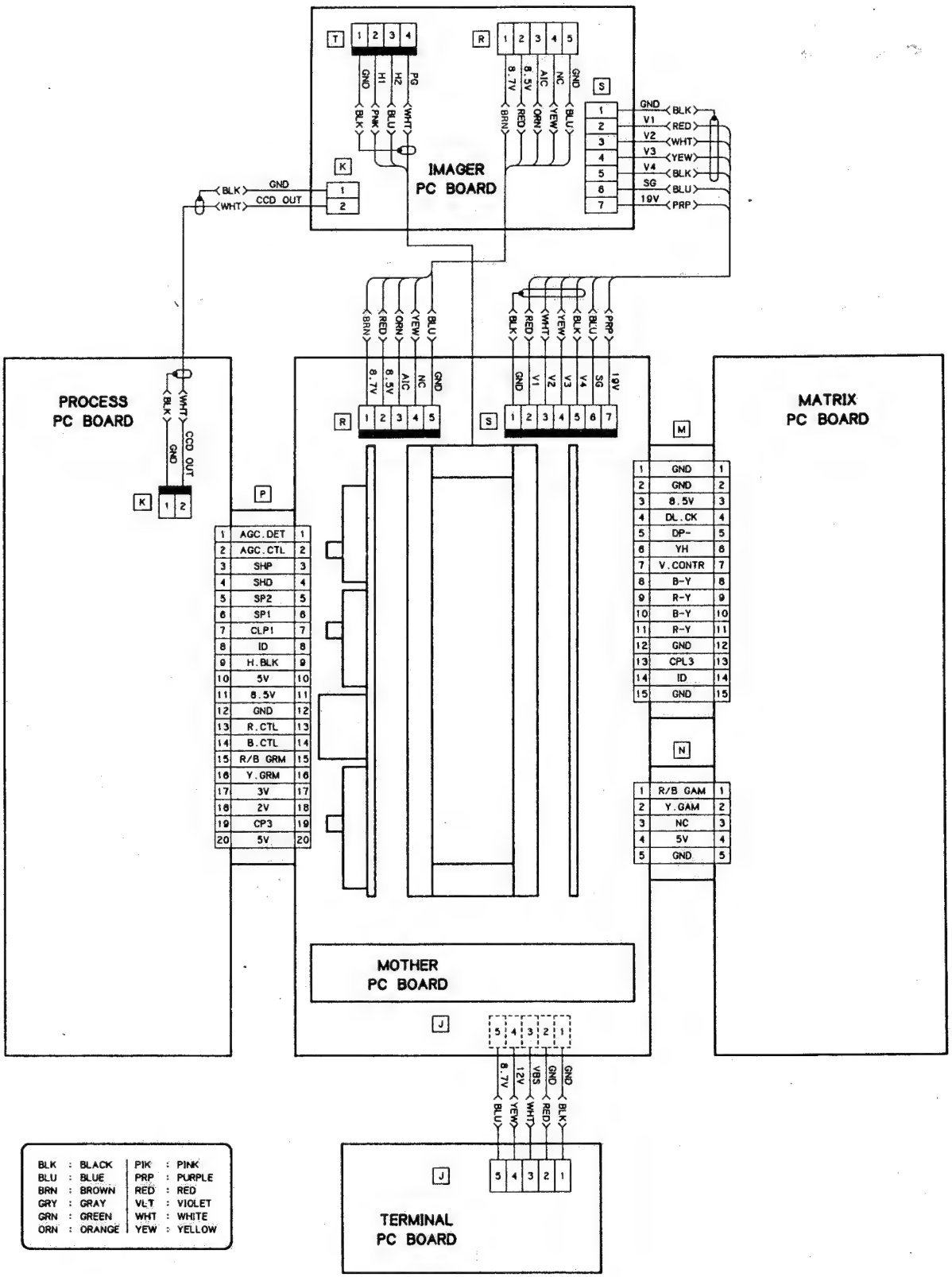


Type of parts
- IC: IC
- Q: Transistor
- D: Diode
- VR: Variable resistor
- TP: Test point

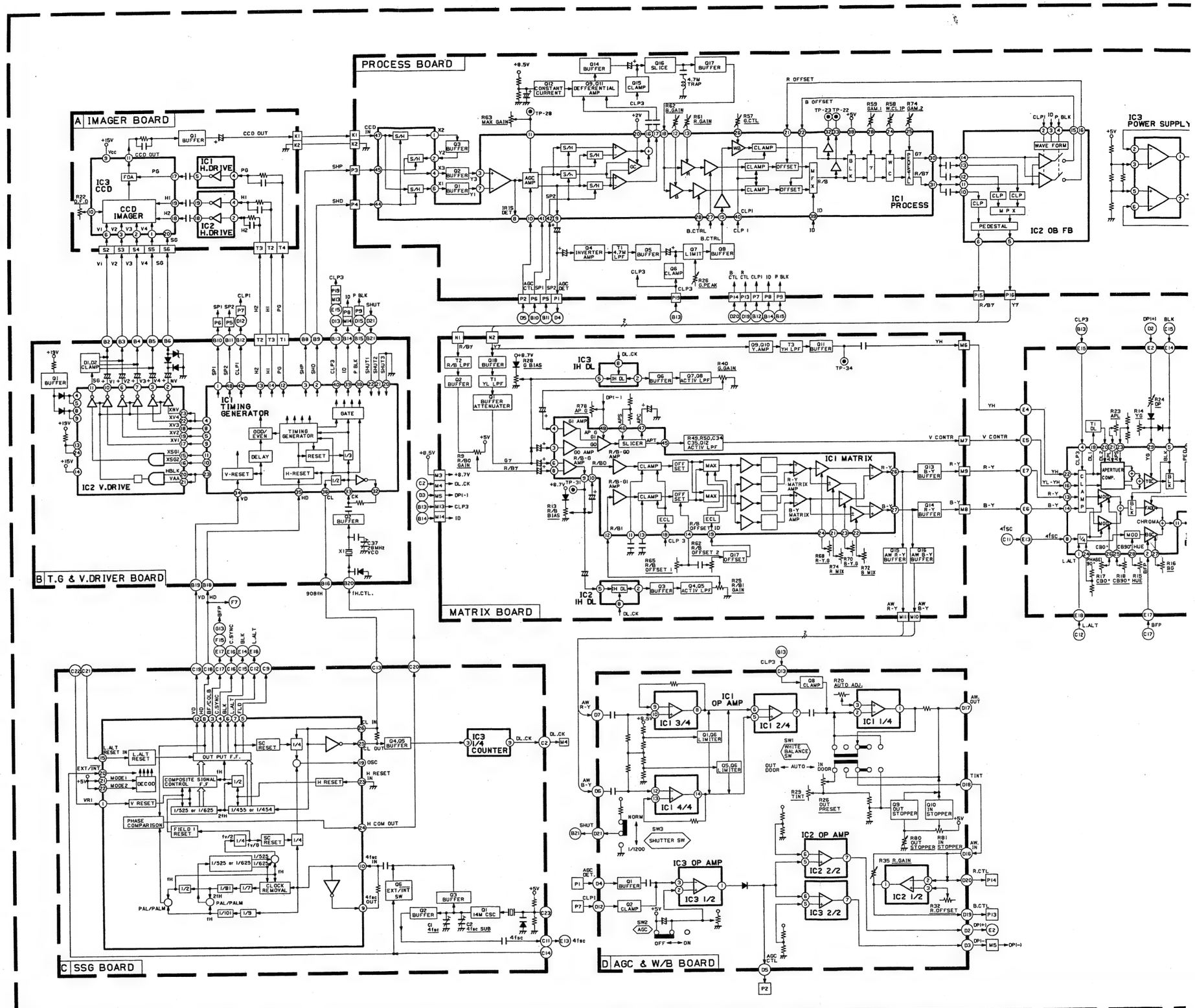
Indicates the parts location in the PC board. The part indicated with the symbol No. exists in the extended line. With the location in the quick reference diagram, the approximate parts locations can be obtained.

Example: D603
When symbol No. "D603" is given in the right side of the quick reference diagram, the diode D603 exists in the lateral extended line and in the right side of the PC board.

3. WIRING DIAGRAM



4. BLAOCK DIAGRAM



MOTHER BOARD

PROCESS BOARD

IC1 PROCESS

IC2 OB FB

IC3 POWER SUPPLY

SW REG.

MATRIX BOARD

IC1 MATRIX

IC3 IH DL

IC2 IH DL

E ENCODER BOARD

IC1 ENCODER

TERM.BOARD ASSY

TMI POWER TERMINAL

J1 VBS OUT

SI LENS SOCKET

DI POWER LED

D AGC & W/B BOARD

IC1 OP AMP

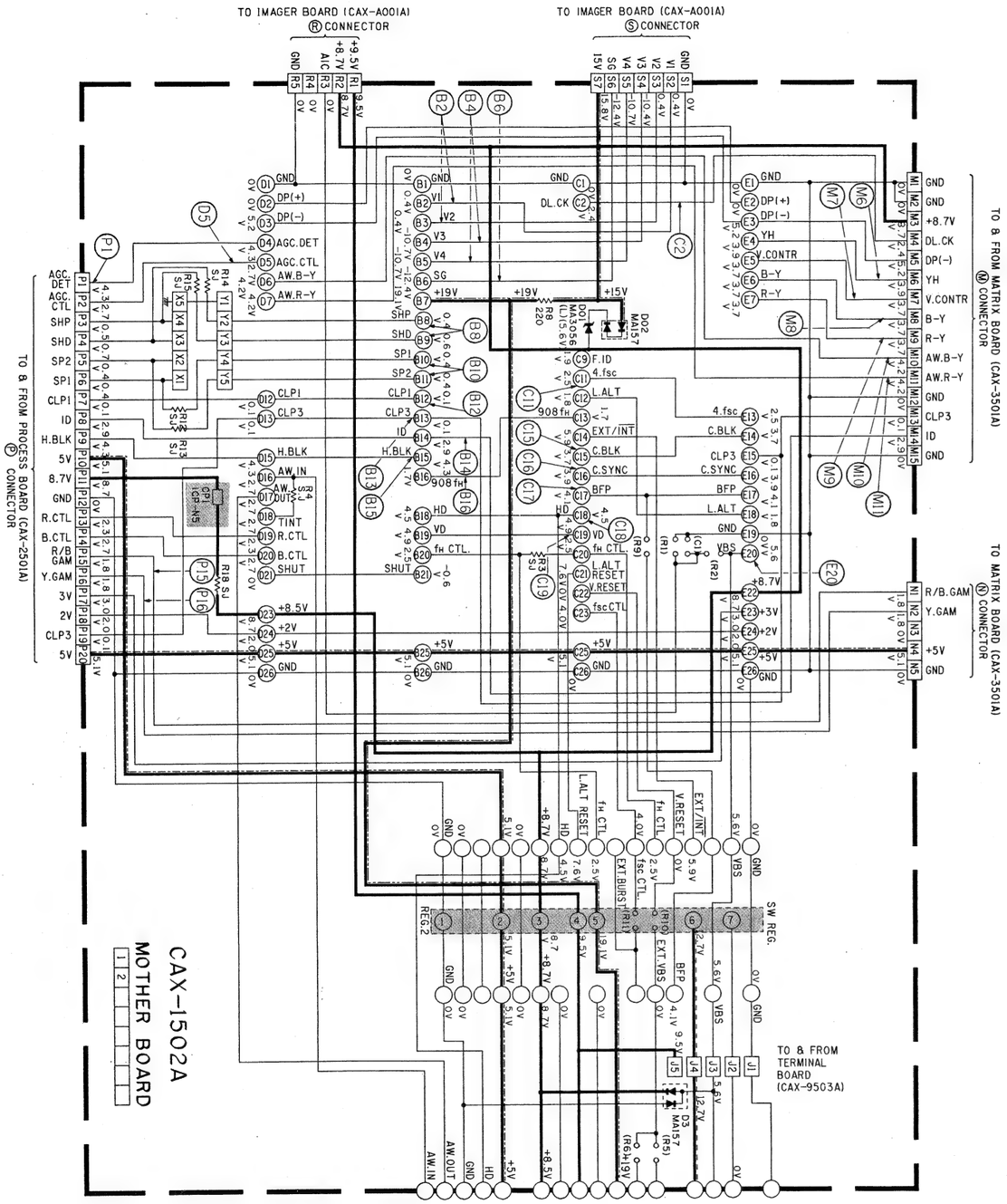
IC2 OP AMP

IC3 OP AMP

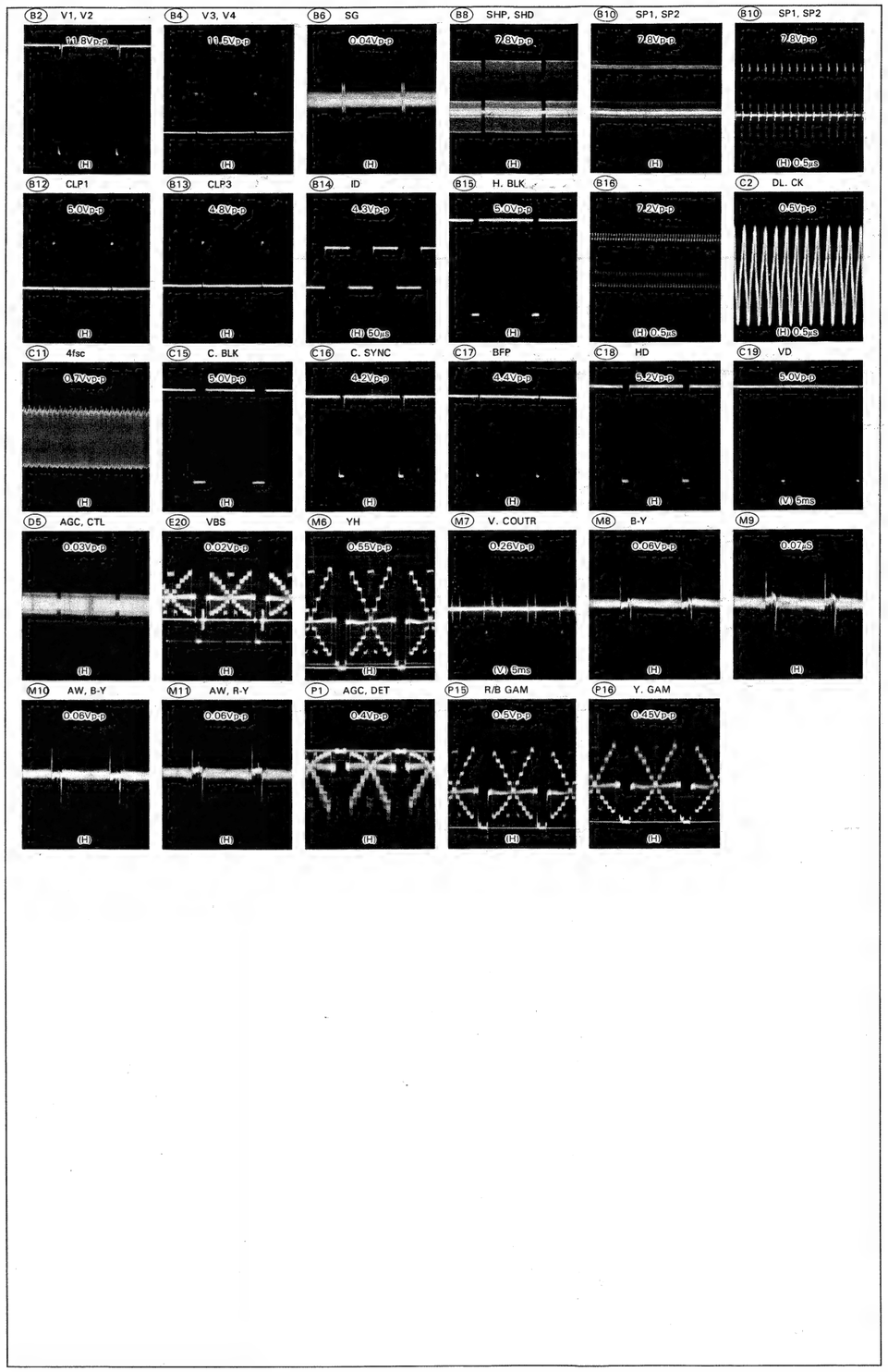
IC3 1/4 COUNTER

5. MOTHER BOARD (CAX-1502A)

● CIRCUIT DIAGRAM

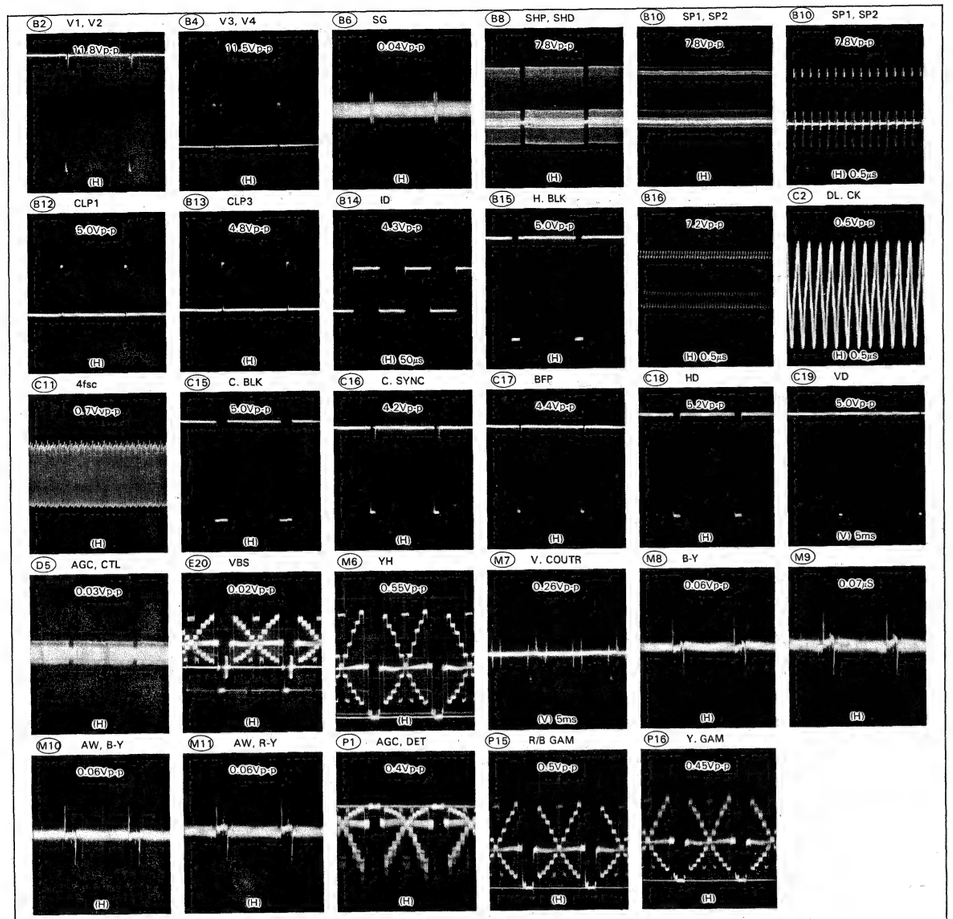


● WAVEFORMS



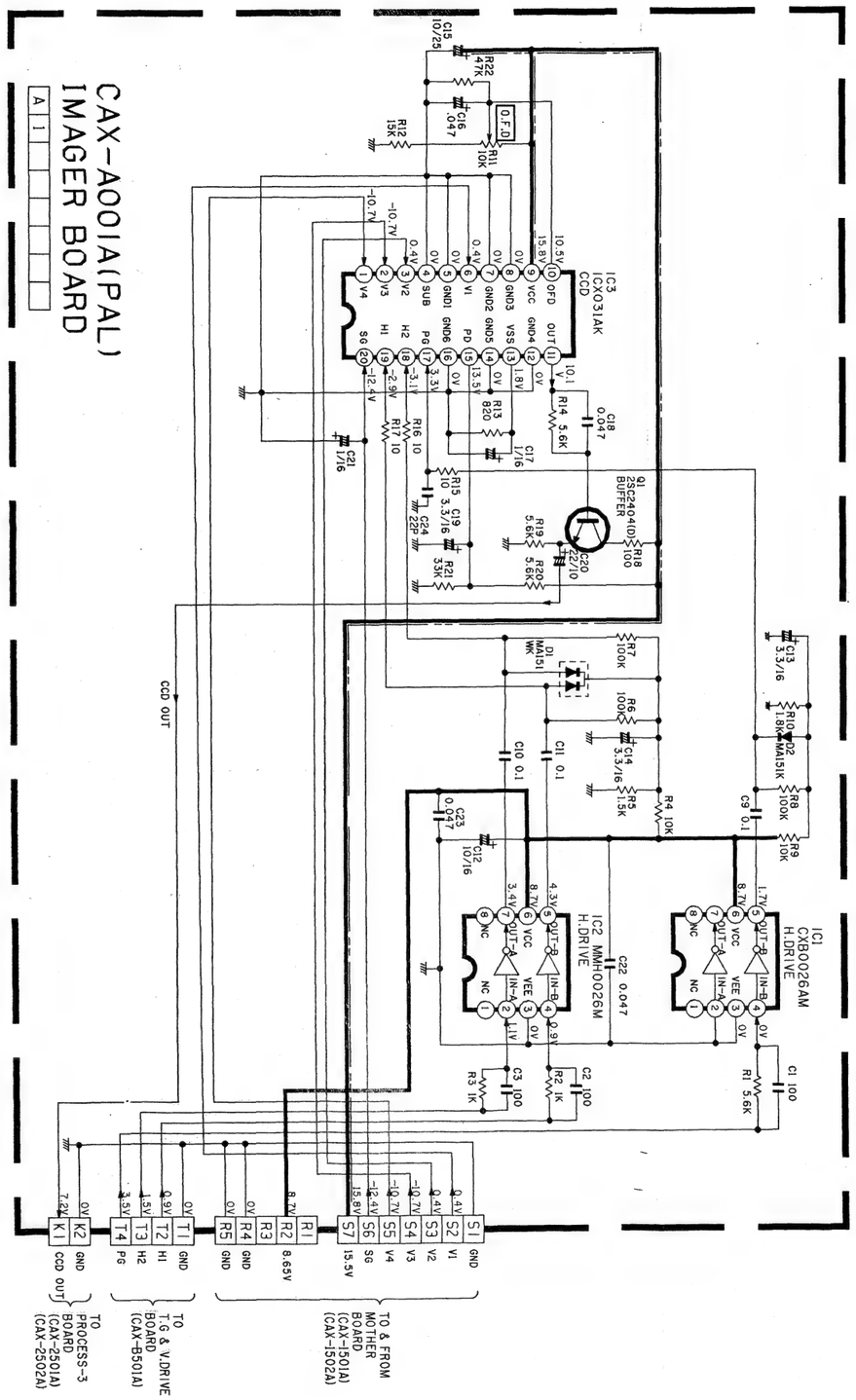
6. I
● C

WAVEFORMS



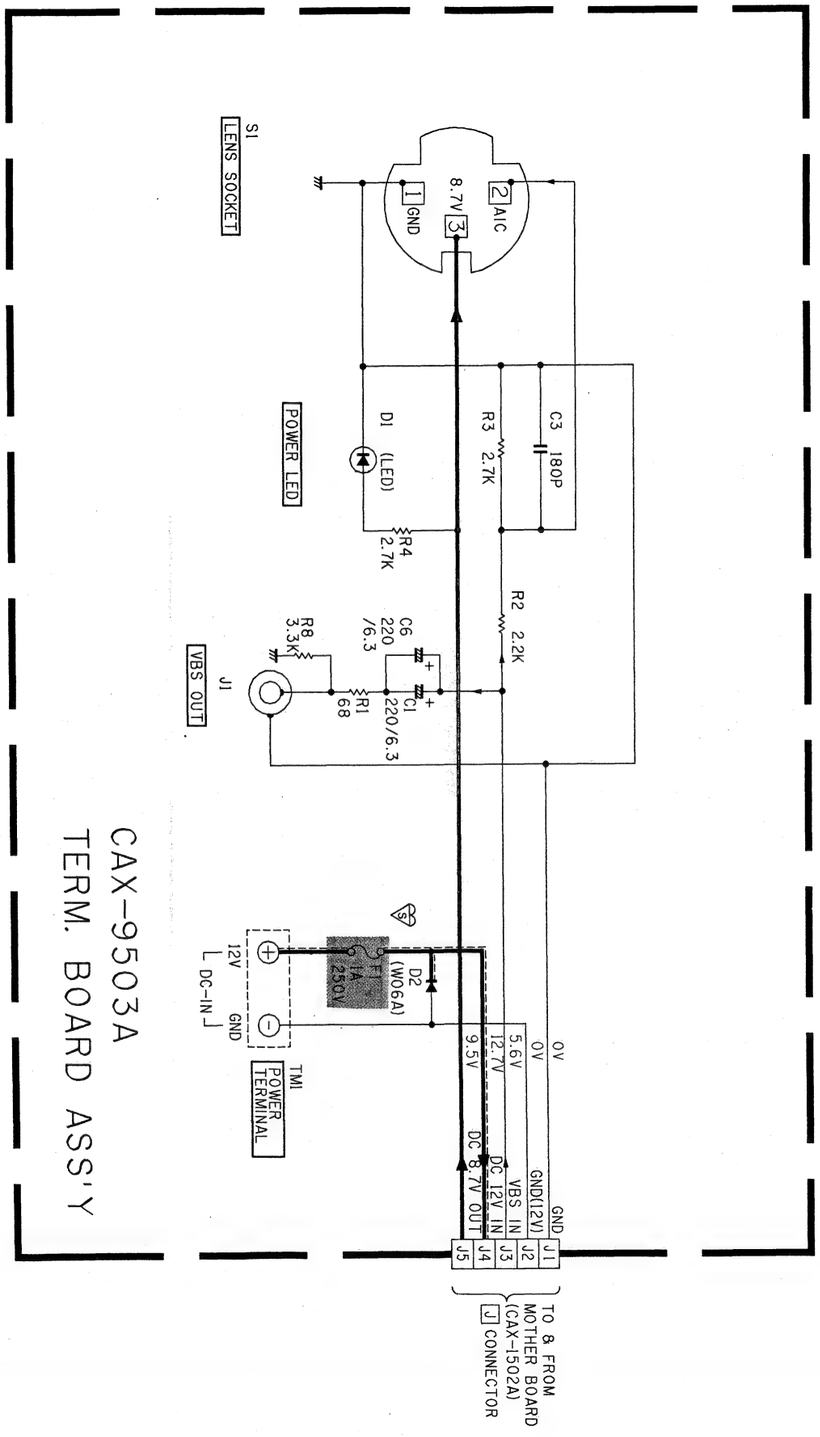
6. IMAGER BOARD (CAX-A001A)

● CIRCUIT DIAGRAM



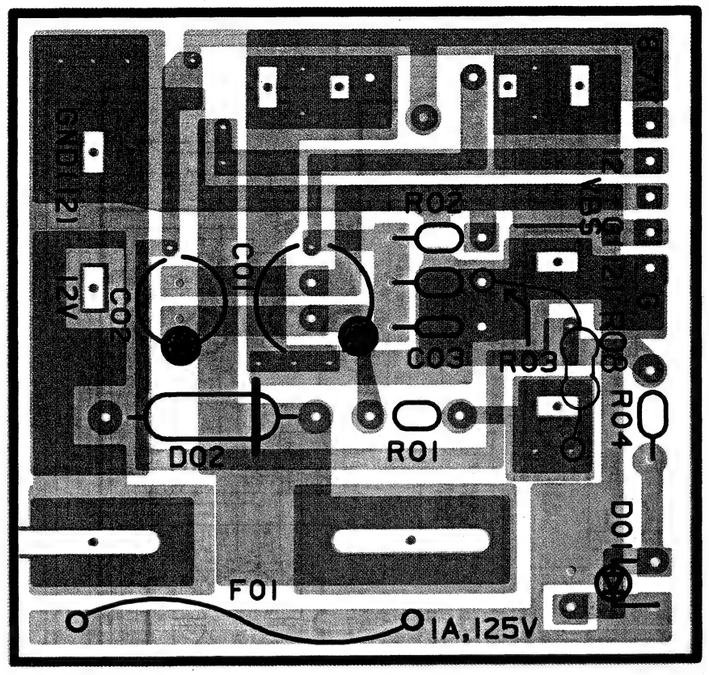
14. TERMINAL BOARD (CAX-9503A)

● CIRCUIT DIAGRA

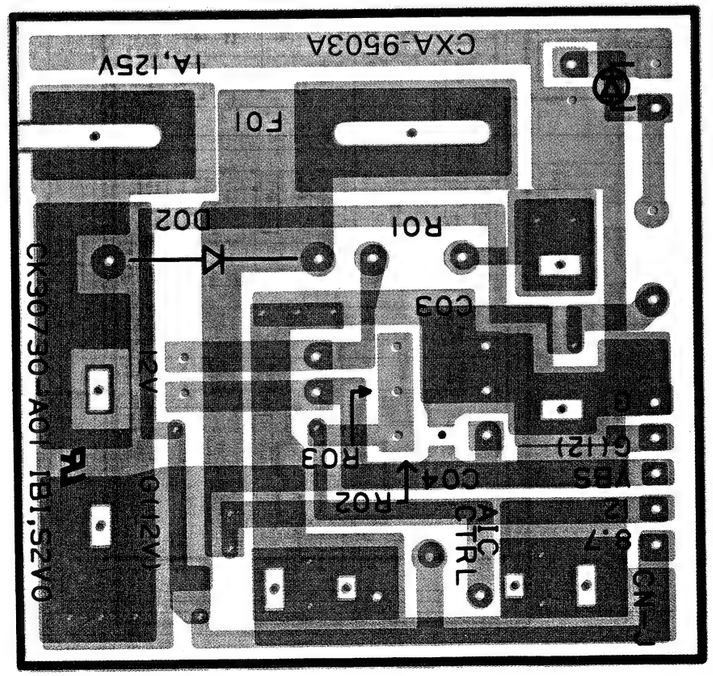


● BOARD DIAGRAM

TOP

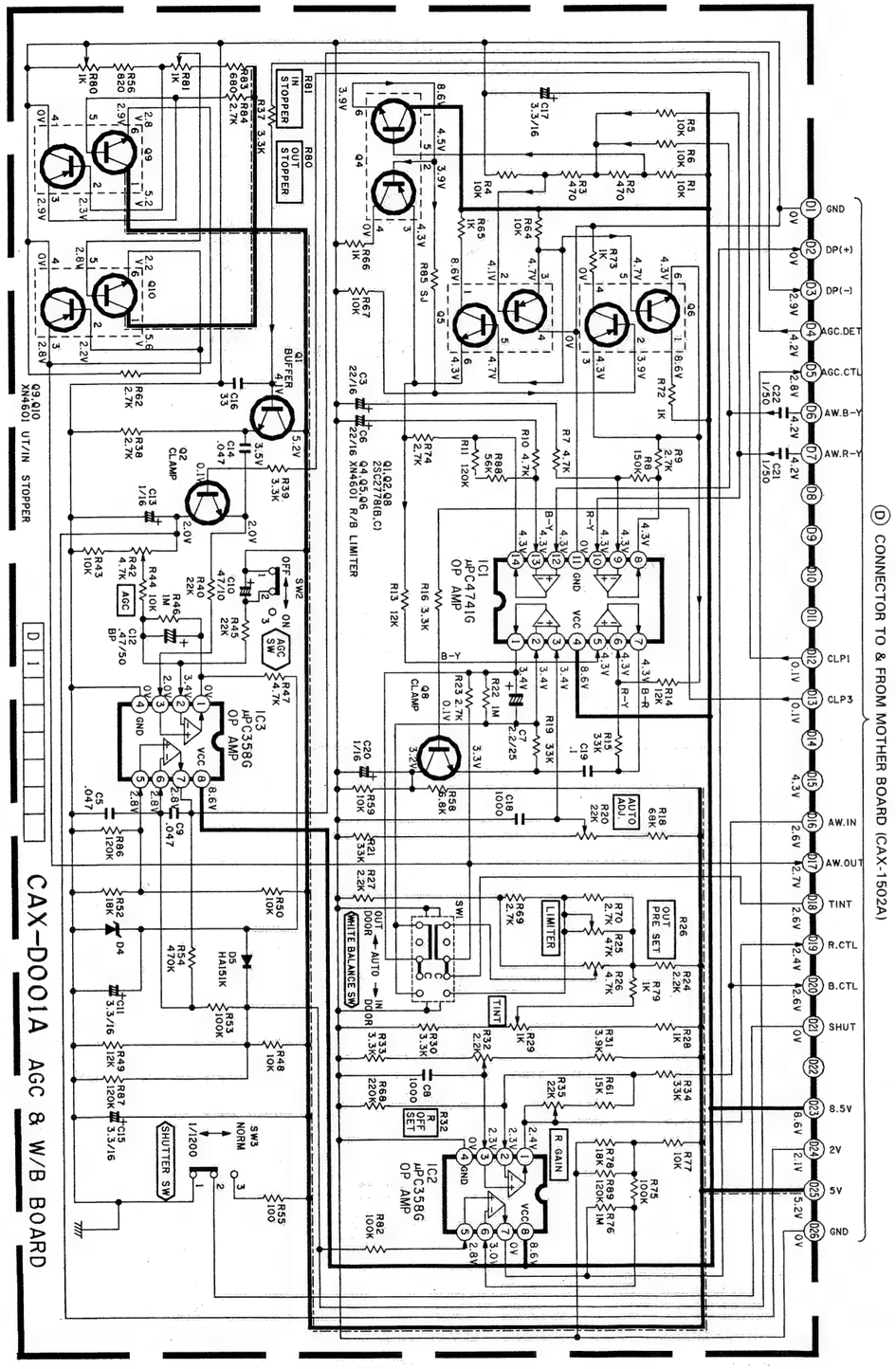


BOTTOM



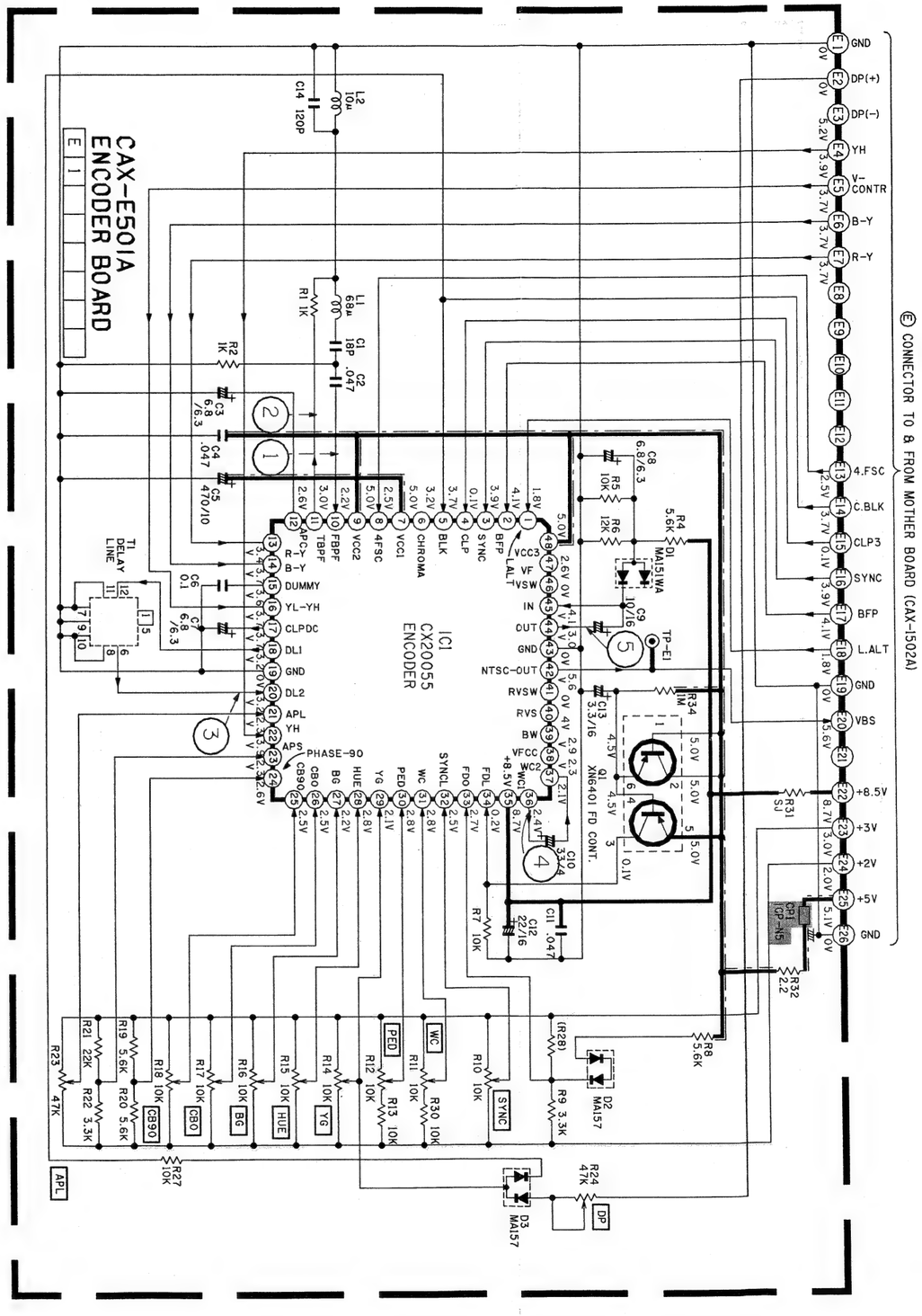
12. AGC & W/B BOARD (CAX-D001A)

● CIRCUIT DIAGRAM



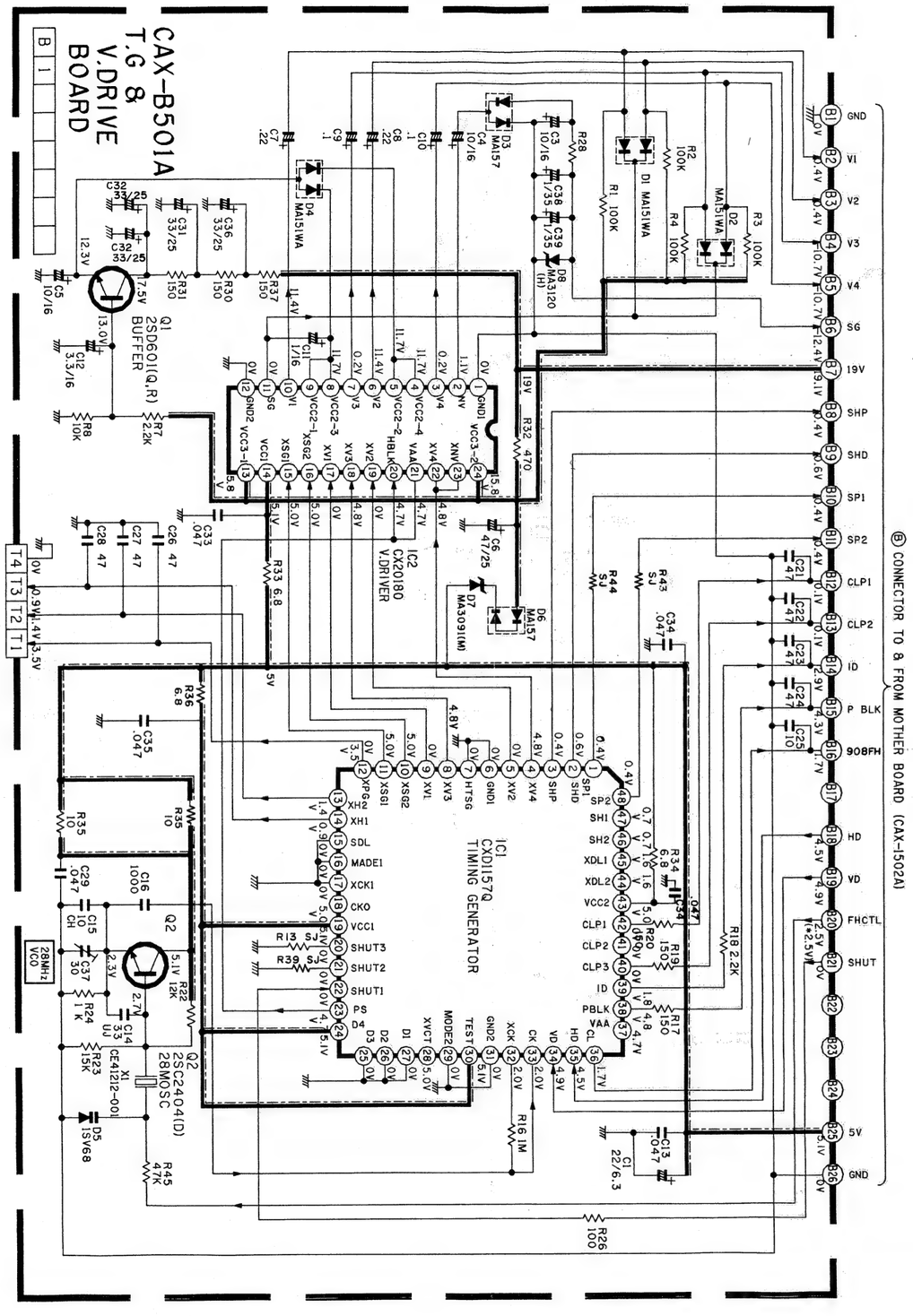
13. ENCODER BOARD (CAX-E501A)

● CIRCUIT DIAGRAM



10. T.G. & H. DRIVE BOARD (CAX-B501A)

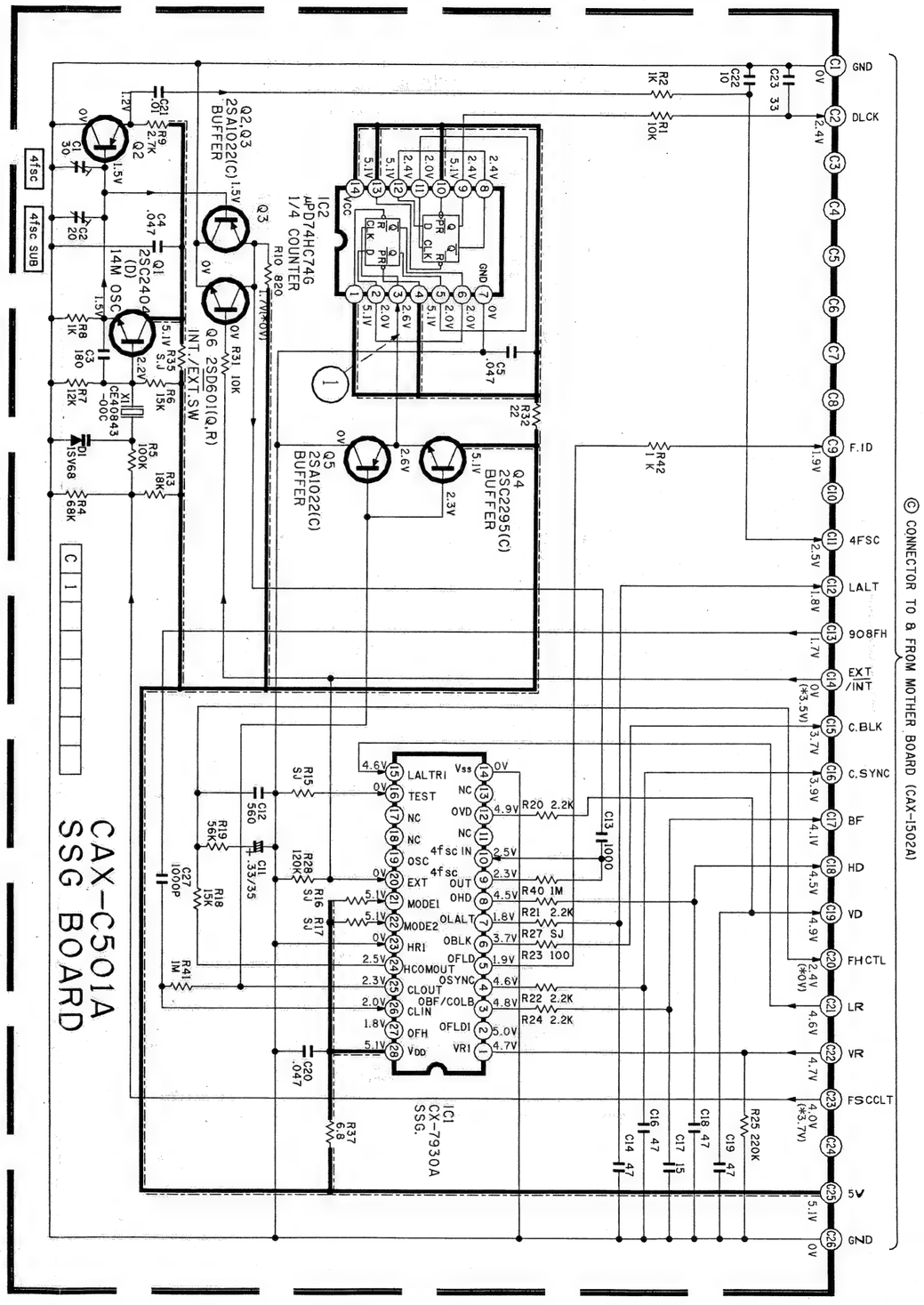
● CIRCUIT DIAGRAM



21 (No. 50106)

11. SSG BOARD (CAX-C501A)

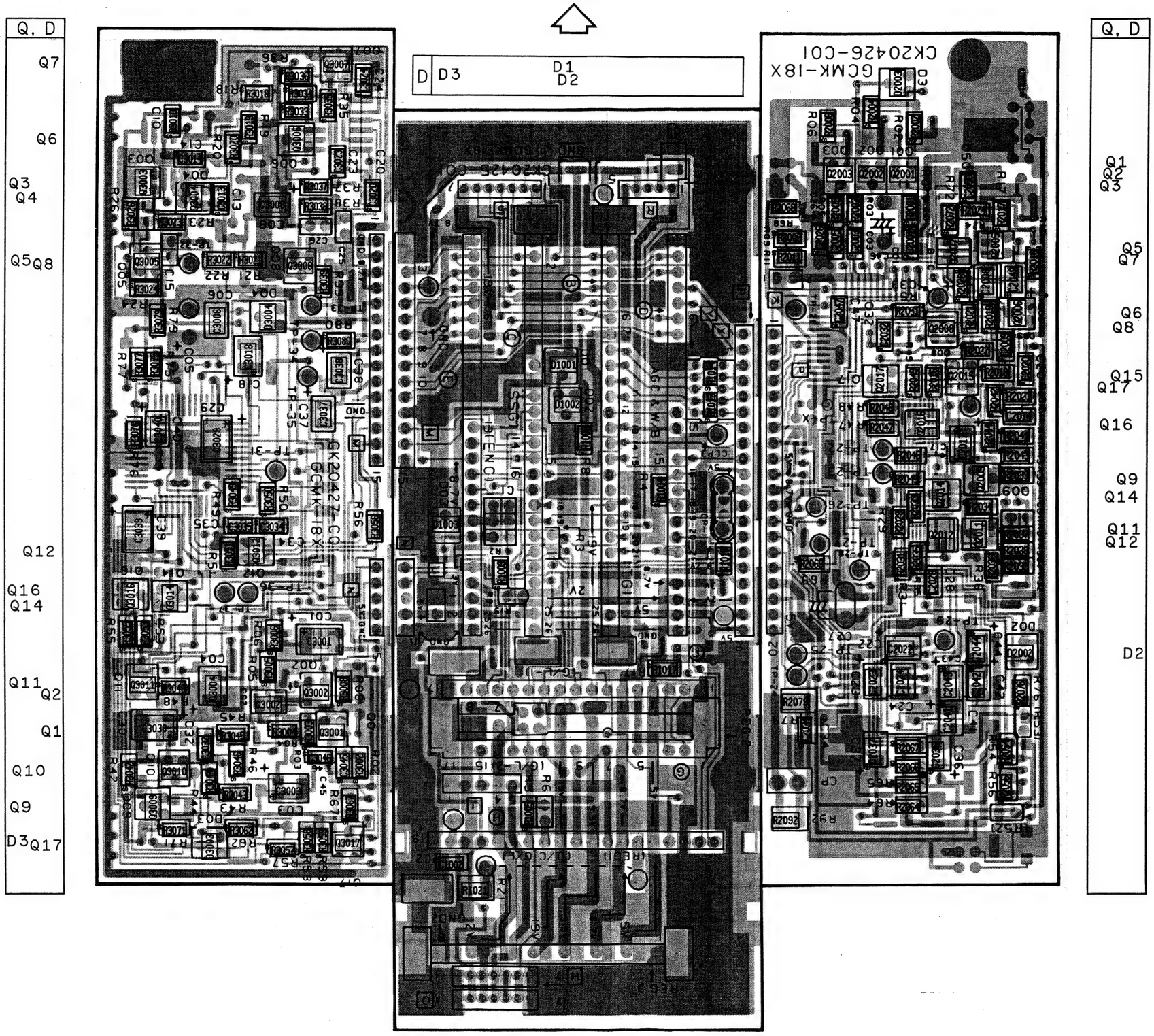
● CIRCUIT DIAGRAM



22 (No. 50106)

BOTTOM

FRONT



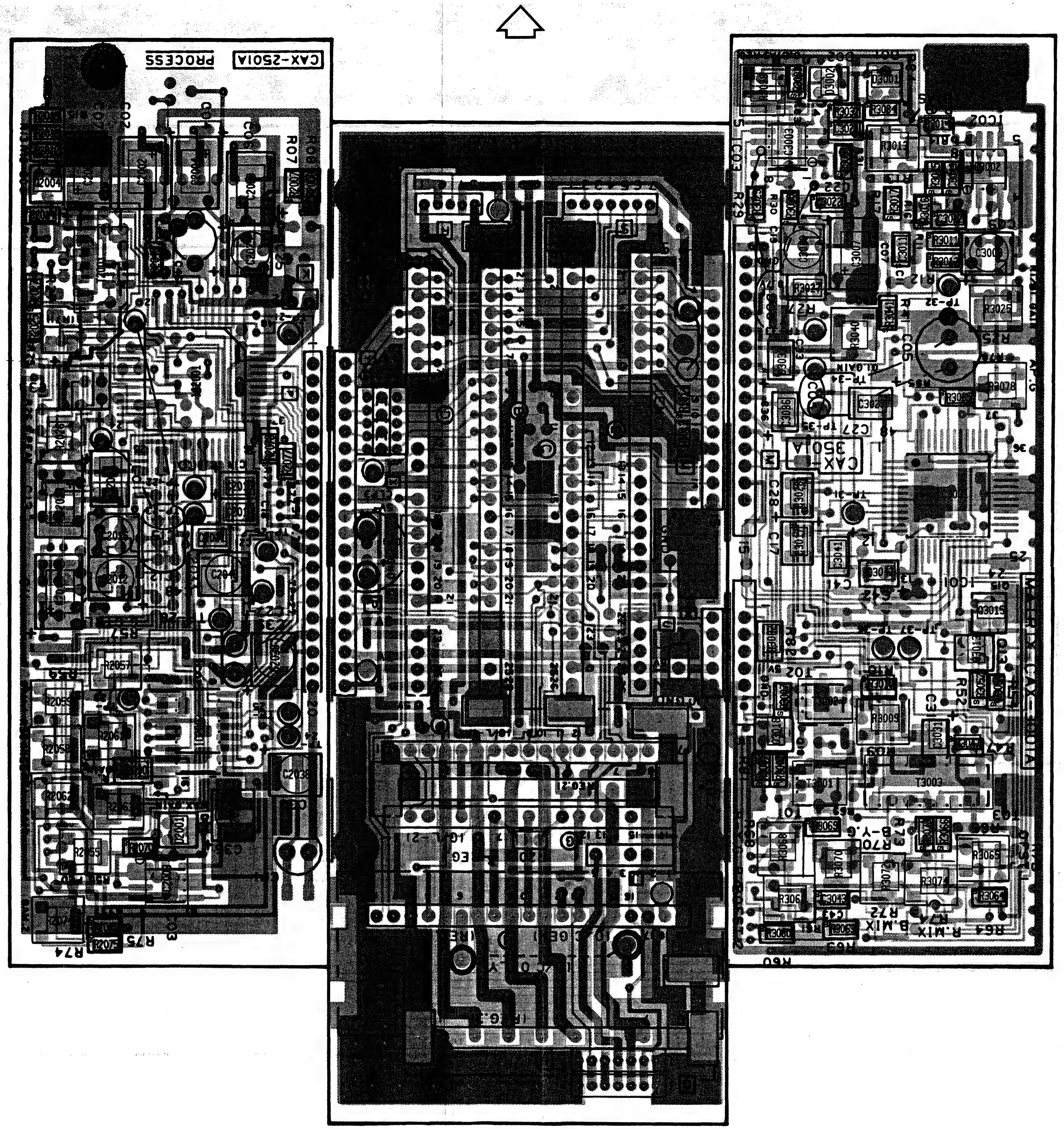
9. MOTHER, PROCESS, MATRIX BOARD

● BOARD DIAGRAM

TOP

I C, Q	D, VR
Q4	
I C1	
	R26
	R57
	R59
I C2	R61
	R58
	R62
	R63
	D1
	R55
I C3	
	R74

FRONT



I C, Q	D, VR
	D2 D1
	R28
I C3	R13
I C2	
	R25
	R40
	R78
I C1	
Q15	
Q13	
Q18	R9
	R68
	R65
	R70
	R72
	R74
	R61

8. MATRIX BOARD (CAX-3501A)

● CIRCUIT DIAGRAM

① IC3 ⑤ pin
0.24Vp-p

② IC3 ② pin, Q6 Ⓑ
0.55Vp-p

③ IC1 ③ pin Go IN
0.23Vp-p

④ IC1 ④ pin G1 IN
0.2Vp-p

⑤ IC1 ⑥ pin GR
0.28Vp-p

⑥ IC1 ⑧ pin
0.3Vp-p

⑦ IC1 ⑩ pin RB-G
0.15Vp-p

⑧ IC1 ⑩ RBO
0.15Vp-p

⑨ IC1 ⑫ pin RB1
0.11Vp-p

⑩ IC1 ㉕ pin, Q14 Ⓑ, Q16 Ⓑ B-Y
0.05Vp-p

⑪ IC1 ㉖ pin, Q13 Ⓑ, Q15 Ⓑ R-Y
0.05Vp-p

⑫ IC1 ㊸ APT
0.05Vp-p

⑬ T1 IN
0.35Vp-p

⑭ T2 IN
0.35Vp-p

⑬ IC2 ⑤ pin
0.15Vp-p

⑯ IC2 ② pin, Q3 Ⓑ
0.65Vp-p

⑰ T3 OUT, Q11 Ⓑ
0.52Vp-p

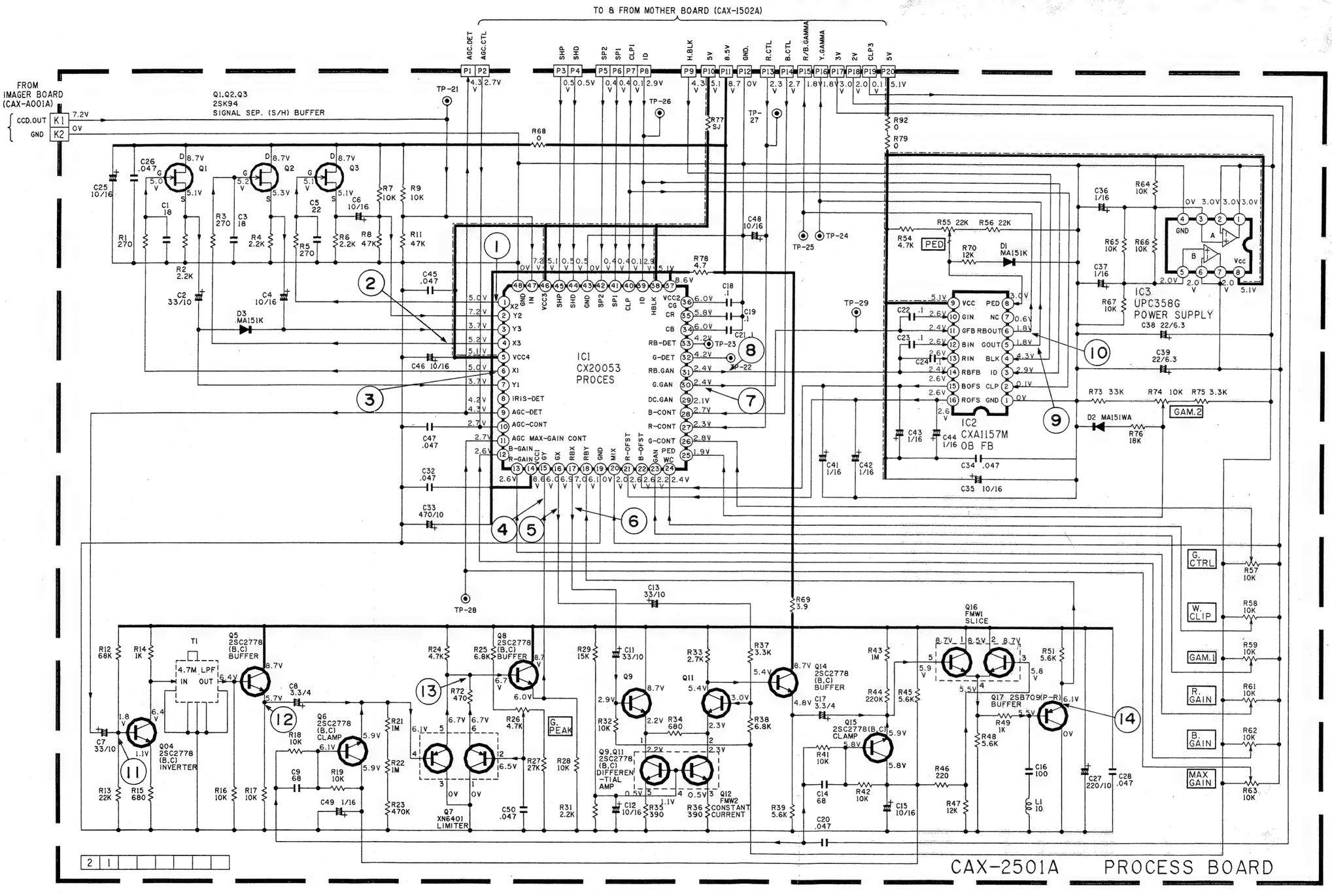
CAX-3501A
MATRIX BOARD

TO & FROM MOTHER BOARD (CAX-1502A)

TO & FROM MOTHER BOARD (CAX-1502A)

7. PROCESS BOARD (CAX-2501A)

● **CIRCUIT DIAGRAM**



① IC1 ① pin X2 — 0.16Vp-p

② IC1 ④ pin X3 — 0.16Vp-p

③ IC1 ⑥ pin X1 — 0.31Vp-p

④ IC1 ⑮ pin, Q8 Ⓔ GY — 0.35Vp-p

⑤ IC1 ⑯ pin GX — 0.32Vp-p

⑥ IC1 ⑰ pin RBX — 0.32Vp-p

⑦ IC1 ㉚, IC2 ⑪ — 0.4Vp-p

⑧ IC1 ㉛ pin, IC2 ⑭ pin — 0.48Vp-p

⑨ IC2 ⑤ pin, P16 — 0.4Vp-p

⑩ IC2 ⑥ pin, P15 R/B γ — 0.4Vp-p

⑪ Q4 Ⓑ AGC-DET — 0.32Vp-p

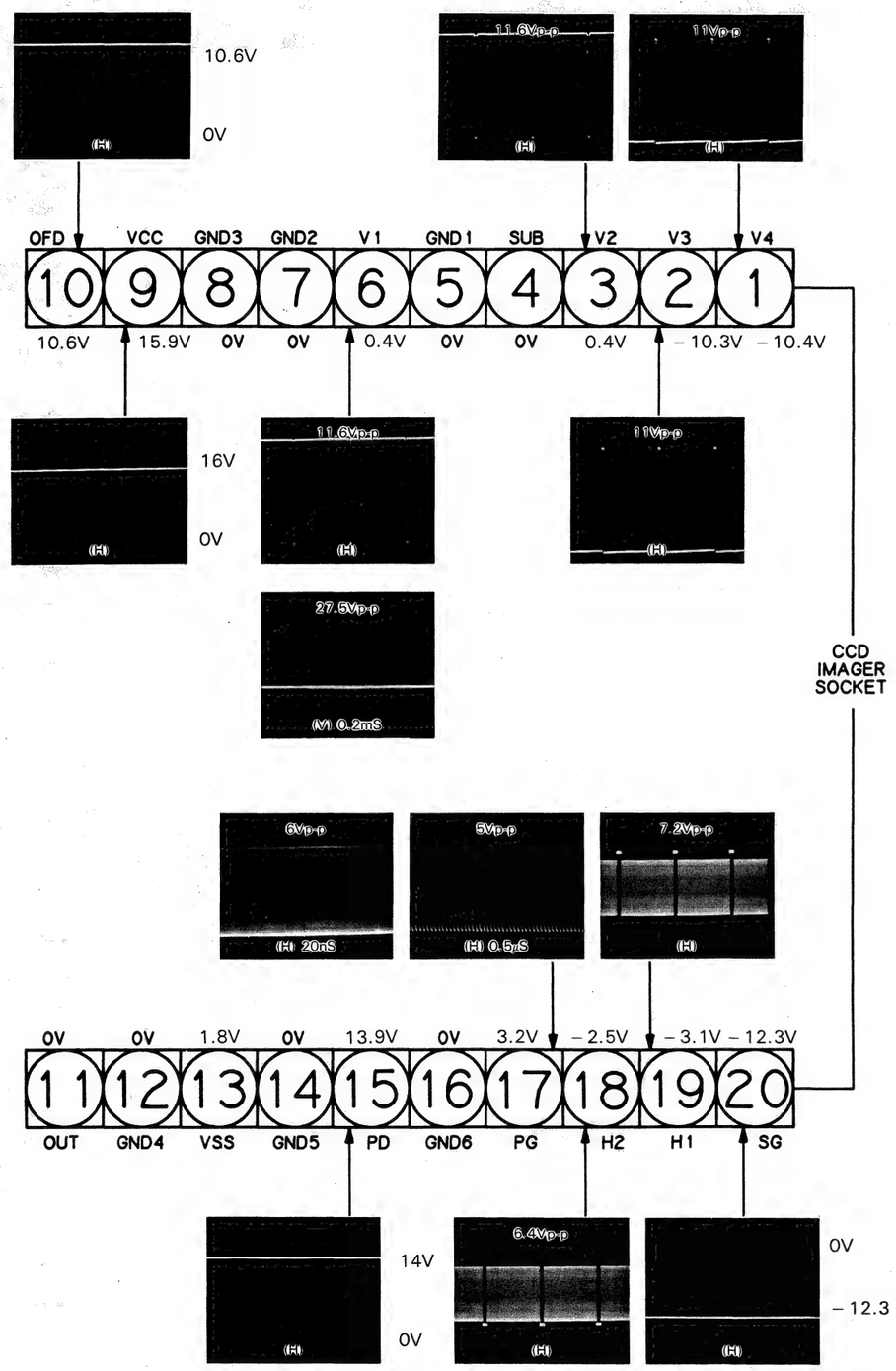
⑫ Q5 Ⓔ — 0.38Vp-p

⑬ Q8 Ⓑ — 0.36Vp-p

⑭ Q17 Ⓔ, IC1 ⑱ pin — 0.48Vp-p

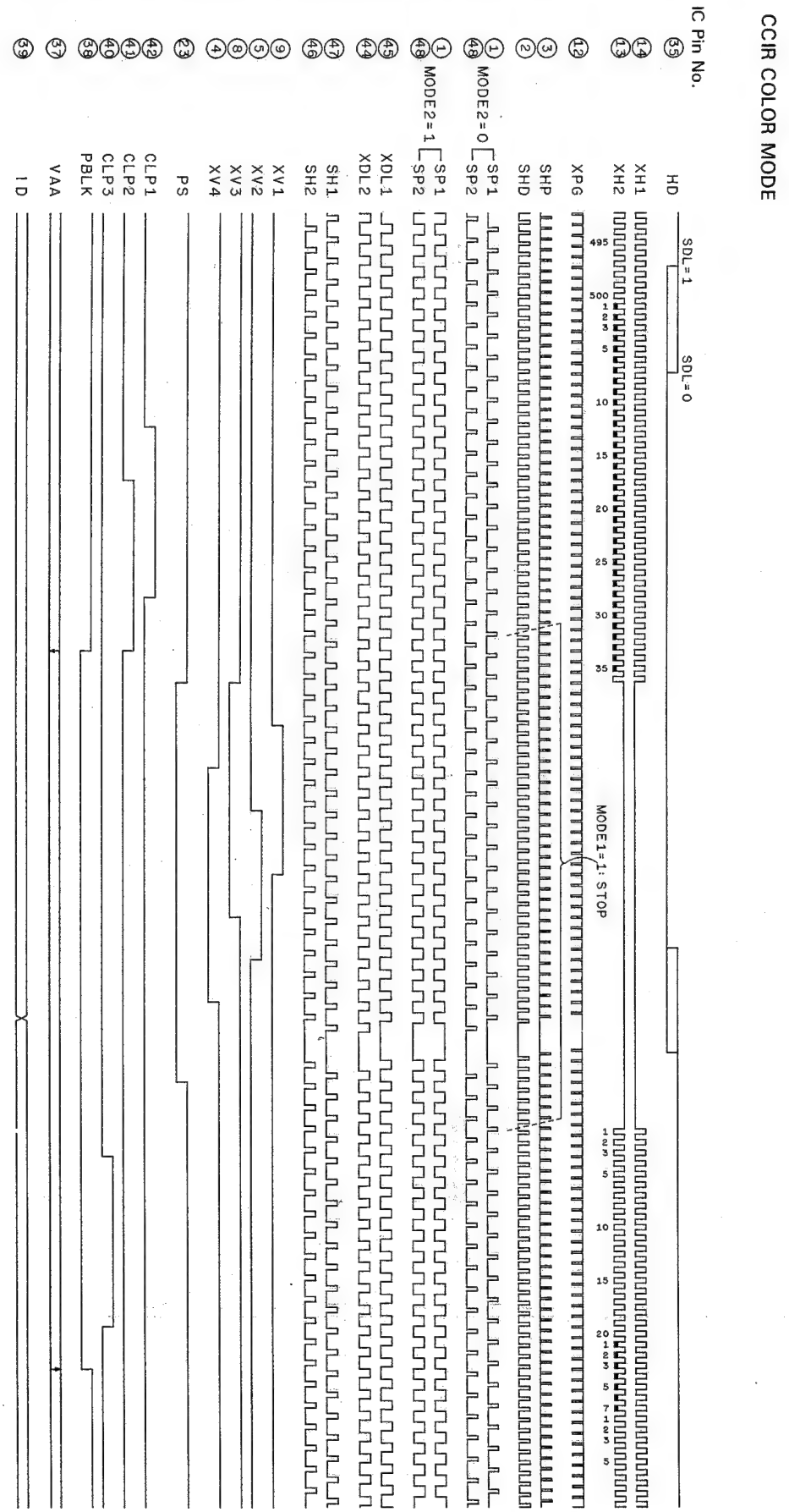
● IMAGER SOCKET OF WAVEFORM AND VOLTAGE DIAGRAM

After removing the imager (CCD) from the Imager board, the waveform and voltage shown in this diagram are measured at the imager socket.



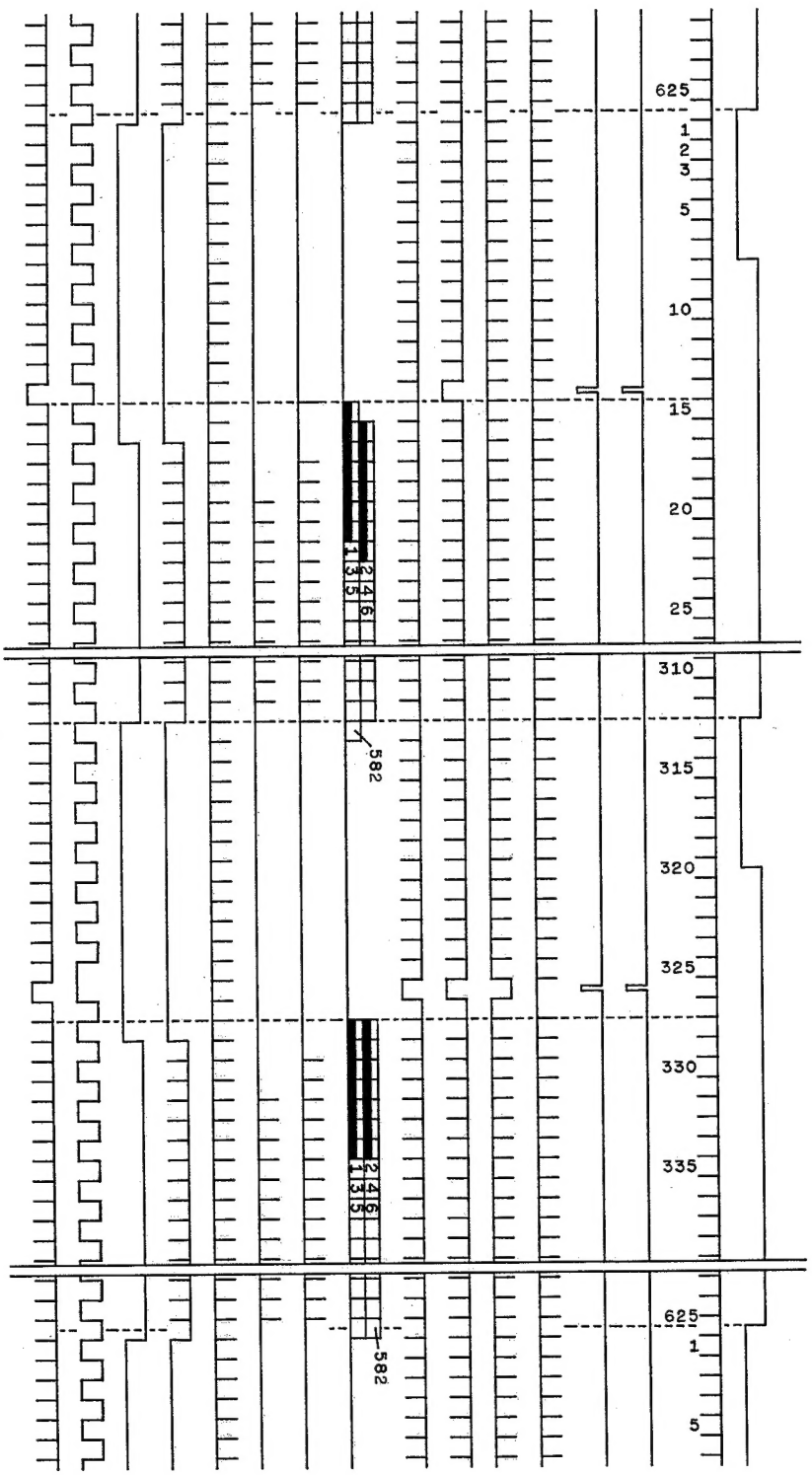
15. TIMING CHARTS

● TIMING CHARTS OF TIMING GENERATOR (CXD1157Q) OUTPUT WAVEFORMS

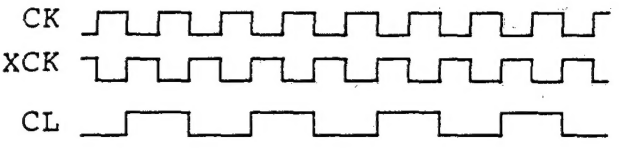


CXD1157Q

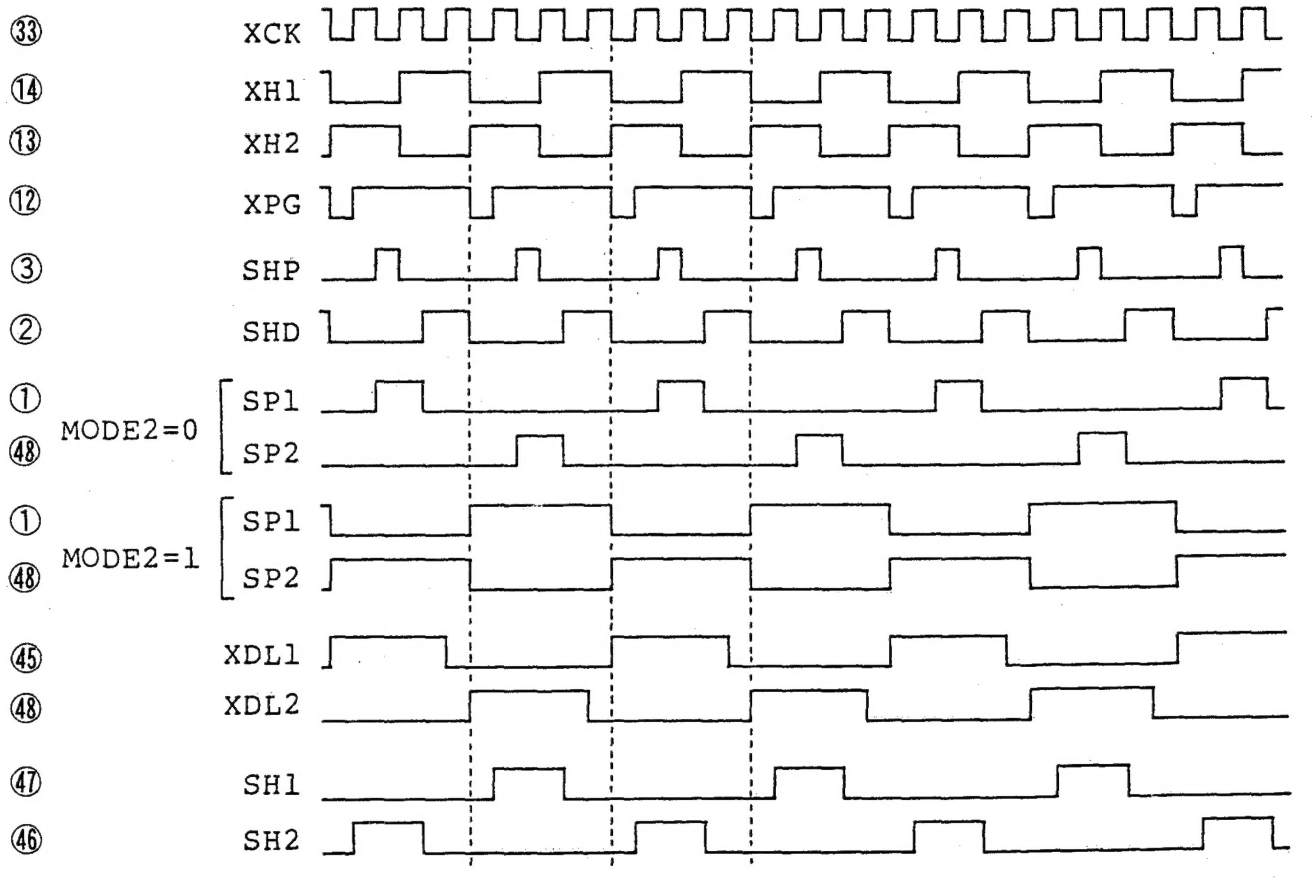
CCIR COLOR MODE



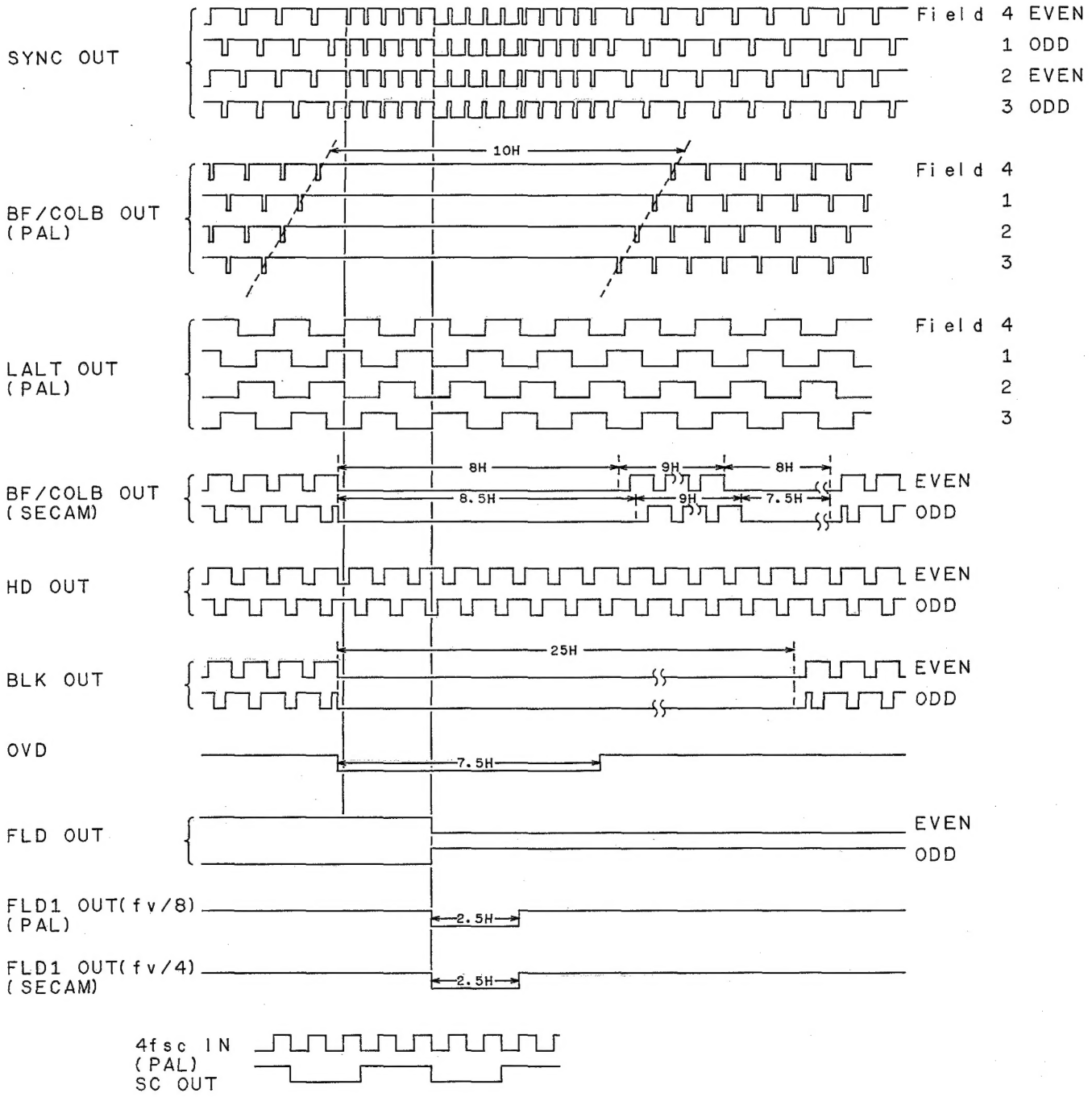
CXD1157Q
High speed pulse-phase



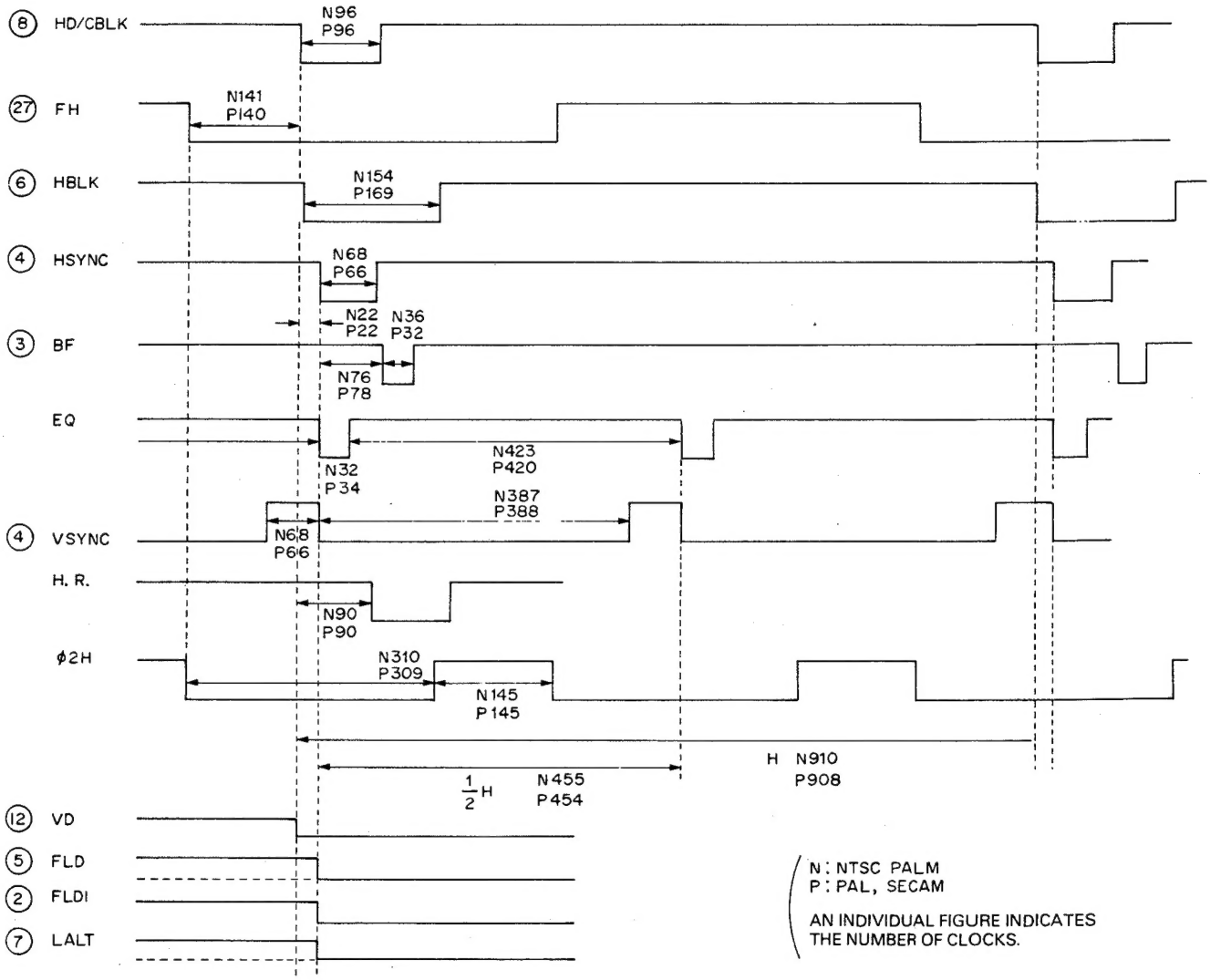
IC Pin No.



● TIMING CHARTS OF SSG (CX7930A) OUTPUT WAVEFORMS.



CX7930A


⑧ HD/CBLK
N96
P96
㉗ FH
N141
P140
⑥ HBLK
N154
P169
④ HSYNC
N68
P66
N22
P22
N36
P32
③ BF
N76
P78
EQ
N32
P34
N423
P420
N387
P388
④ VSYNC
N68
P66
H. R.
N90
P90
φ2H
N310
P309
N145
P145
H N910
P908
1/2H N455
P454
⑫ VD
⑤ FLD
② FLDI
⑦ LALT
N : NTSC PALM
P : PAL, SECAM
AN INDIVIDUAL FIGURE INDICATES
THE NUMBER OF CLOCKS.